USING ICT IN THE ROMANIAN EDUCATION SYSTEM:
S.E.I. PROGRAMME

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Abstract
SEI programme is a national-wide initiative whose objective is to implement ICT in the education system by providing schools with the necessary equipment, by developing a wide range of computer applications meant to ensure the interaction between students and curricular contents, by training teachers in using ICT for education, and by establishing the premises of a IT-based network in support of modern management. The present paper present the results of a recent evaluation research on SEI programme, developed by the University of Bucharest in collaboration with research institutions and education NGOs.

Keywords: elearning in formal education, SEI programme, evaluation results.

1. SEI Programme

Launched in 2001, the SEI governmental programme (from Sistem Educational Computerizat – IT-Based Education System) is a national-wide initiative whose objective is to integrate ICT into the education system by providing schools with the necessary equipment, by developing a wide range of computer applications to ensure the interaction between students and curricular contents, by training teachers in using ICT for education, and by establishing the premises of a IT-based network in support of modern management [1] [4].

SEI is not an alternative solution to traditional teaching (teacher-centred); it is rather a complementary one, with teachers making the decision on the educational process – strategy/method, resources – so as to enable as many students as possible to meet curricular objectives [3].

AeL is an integrated teaching/learning and content management system that facilitates the activities of the actors involved in the educational process and its design – teachers, students, content developers, evaluators, managers etc. The system has a flexible knowledge centre, which plays the role of a content and management solutions storage device. The knowledge base offers the following possibilities to its users:
- content creation: HTML editors incorporated; mathematical formulas editors incorporated; test and tutorial editors; glossary/dictionary editors;
- text import and export from files, archives/resource folders, format based on such standards as SCORM, MathML, SVG, ChemML;
- content adaptation and modification;
- content organisation in courses;
- creating new lessons from standard content components;
- directed teaching and monitoring of educational content;
- student testing.

AeL offers HTML editors, mathematical formulas editors, editors for chemistry, geometry, physics, and tutorials for the on-line content. The educational software is designed so as to respect a methodology which is continuously improved based on data obtained from school practice.
For the Romanian education system, the educational portal http://portal.edu.ro was established within the project. The portal has different components for students, teachers and parents, as well as elements of connection with higher education. The portal has over 80,000 registered users and a collection of incorporated web sites.

These are the stages in the **SEI implementation**:

SEI-1 (2001-2002): the pilot period – design and experimental use of the main components, adjustments at different levels based on the data that were obtained.

SEI-2 and SEI-3 (2003-2004): the transition period – the communication lines and technical support were established, the general methodology for implementation was developed and the favourable area was covered at high-school level; the methodology for construction, approval and distribution of multimedia educational contents.


The results of this process are presented here in a synthetic form (data from December 2006):

- **a)** equipment: 76,000 computers and servers; 4,780 laboratories, auxiliary equipment included;
- **b)** IT labs at the Ministry of Education and the 42 county school inspectorates and teacher centres;
- **c)** computers for administrative use,
- **d)** educational software in every laboratory for teaching, testing and assessment, school management, educational content management.

The multimedia educational content distributed in each school includes 1650 lessons for grades 5-8 (gimnaziu) and for 9-12 (high-school), 8500 RLOs for: Biology, Mathematics, Computer science, Languages, History, Geography, Chemistry, Physics, Technologies etc.; encyclopaedias, dictionaries, glossaries [3]. Some 25,000 high-school teachers and 40,000 lower secondary teachers have been trained in the use of ICT.

The results of the 4\textsuperscript{th} stage: 3,270 laboratories in schools; 42 laboratories for the teacher centres; updates for the laboratories established in 2001; 1,255 multimedia lessons; multimedia English lessons for grades 1-8; 40,000 teachers included in the training programmes.

The SEI programme will continue to support the development of education in Romania, to contribute to the democratisation of the education system trying to meet the objectives for the rural, vocational and primary areas, to support the consolidation of the e-learning community developed through SEI, the complex pedagogical re-professionalization for teachers and the provision of modern technologies to the Romanian schools.

### 2. Investigation

A comprehensive evaluation research was developed by the University of Bucharest in collaboration with the Institute for Education, with TEHNE – Centre for Innovation and Development in Education, and with Association for Education Sciences (ASTED) during May 2007-June 2008. The research was designed by Prof.Dr. Dan Potolea and by Dr. Eugen Noveanu, from the University of Bucharest.

The investigation reveals the following aspects: (a) to what degree different types of schools are provided with computers and other equipment, (b) students’ and teachers’ access to the new technologies, (c) to what degree these technologies are used (d) the impact the use of the new technologies had in the beneficiaries’ view (managers, teachers, students), including different kinds of problems which require interventions/ solutions, as well as human/technological/ financial resources.

From a methodological point of view, the investigation was carried out with the help of specific questionnaires for each of the main three categories of beneficiaries (students, teachers and school managers), that were applied to a representative sample in each category.

1. School manager’s questionnaire – 195 valid questionnaires;
2. Teacher’s questionnaire – 1588 valid questionnaires;
3. Student’s questionnaire – 3953 valid questionnaires.
3. Some interesting findings

The research report is focused on the way in which the new ICT are used in the Romanian education system for teaching and learning activities, for school collaboration and for development to students of competencies for the XXI Century.

The results reveal a positive impact on the education system, both on teaching staff and on learners. Regarding the teachers’ activity, ICT have the greatest role in the facilitation of the learning objectives achievement, followed by the discharge of teaching activities. Regarding the organisation of the education process, the value of using ICT is pointed out by teachers especially concerning active and participative learning, as well as concerning cooperative learning. Seven teachers out of ten (70.2%) reveal a positive impact of ICT on the learning performance at their discipline and 65% declare that they use a computer well or very well.

Another aspect revealed by the study indicates that teacher training in Computer-Assisted Instruction has a significant importance. 83% of the teachers which have followed a specialised course relate a positive impact of using ICT on students, comparing to only 65% of teachers which have not participated to courses focused on ICT in education.

At their turn, students consider that the most important effect of using the ICT for school lessons is the fact that they learn easier, followed very shortly by an easier understanding of content and by the fact that they learn to better use the computer.

Only 0.9% of the students do not use the computer; 63% use the computer at school and 83% use the computer at home.

95% of the students declare they would want to use more the computer and the Internet for lessons of various disciplines. They consider, in a proportion of 90%, that those of them which do not have access to a computer will be disadvantaged later in their professional and social lives.

4. Conclusions and recommendations

4.1. Conclusions

The data gathered from the sample and the methodology we described allow the formation of a synthetic, general image on the state of implementation of the SEI Programme which reveals the following elements:

a) the implementation process is running in accordance with the Programme objectives, both with regard to the provision of schools with computers and equipment, and the users’ training;

b) in comparison with the data from the first evaluation report (2004), we can see a significant increase in the number of teachers who have started to use ICT in the educational process, facilitating the structuring of a common pedagogical culture (organizational) for the majority of the teachers in a school, representing “the common factor” of the entire education system;

c) in the implementation process, there are many problems related to the provision of material resources which cannot be solved at a local level.

In the four sequences that have been investigated – provision, access to new technologies, the use of ICT and the impact of using ICT – the results of data analysis lead to the following conclusions:

1. The provision of schools with computers and equipment represents a very different range of situations due to the conditions in the period before the SEI Project. At this moment, the process is marked by a sensible equalising trend/ uniformity thanks to the SEI laboratories. The conditions in the schools from urban areas are better than in rural areas from this point of view, as they have more experience in looking for and asking for funds, finding support from communities with better financial possibilities. In the last two years, there has been a faster progress with regard to the schools’ connection to the Internet, which still remains an unsolved issue for 40% of computers in rural areas.

The most important problem (indicated by more than 50% of the school managers is the lack of qualified personnel for the maintenance of the network; the current situation – when the computers and the networks are administered by computer science teachers, by network
administrators or by a specialist firm – should be re-evaluated, opting either for a unitary solution, or for differentiated solutions based on local conditions.

2. **Access to new technologies** is differentiated according to the specific categories of the “beneficiaries” in the system.

For the category of “teachers”, the first important issue in point of “access” is the “technical” training – the initiation courses for the use of AeL. Although the number of teachers who can use a computer has significantly grown in the last years (approximately 50%, with explicable differences between high-school and gimnazii), the large number of teachers who still cannot use a computer is concerning. The same conclusion is valid for the number of teachers who have not participated in ICT training courses, although the data show an increase in teachers’ participation in such courses.

Students’ access to ICT is stimulated by the special interest of this category of beneficiaries, the overwhelming majority (95%) saying that they would like more lessons in which they use ICT. This affirmation is supported by the significant percentage of students who use a computer at home (83%) or in other places outside school (21.5%), with a difference between urban and rural as main location.

The most frequent independent use of computers by students is for communication purposes (chat, forum, email), but knowledge building activities (learning for school subjects, computerised initiation, information/research) have a greater share in the total of activities included in the questionnaire.

Students’ access to ICT is ensured most during the school hours, but there are already many schools where students have unlimited access outside school hours or based on a schedule (for classes), high-schools and the urban areas being advantaged.

The educational software for school subjects is mostly obtained through the SEI Programme (free of charge), being completed by software downloaded from the Internet or bought with the school’s funds. These are completed by software created by teachers and students, a stimulating action supported through the competitions organised by SIVECO at a national level. In this process, the teachers from urban areas are advantaged compared to the teachers from rural areas due to the greater number of those who own a computer (85.1% U compared to 69.4% R), the difference remaining also for the access to the Internet.

3. **The extent to which teachers are familiar with ICT** and their use in the educational process is confirmed by the following findings: a) more than 95% of the teachers in high-school and gimnazii education, as well as almost 70% of the teachers in primary education use the SEI laboratories; b) 17% of the teachers organise more than 6 lessons per semester in the laboratory, the most frequent situation being that of the lesson (in gimnazii) in a SEI laboratory with AeL installed.

With regard to the number of students per a computer, the situations vary a lot: if a little past half of high-school students work one on a computer at a time, approximately 35% of them work in groups of 2, 7% in groups of 3, and approximately 1.3% in groups of 4. Obviously, this situation (with smaller indicators in gimnazii and SACs) justifies the insistence of the headteachers who are asking for supplementary provision for the SEI laboratories.

The order of the first 5 “advantaged subjects” with regard to the use of AeL, except for the computer science, remains that revealed also in the 2004 Report: biology, physics, chemistry, geography, and mathematics. This situation is determined on one hand by the quantity and the quality of available software and on the other hand by the “local” conditions – the teacher’s capacity and interest in designing and creating software, his ability of looking on the Internet for educational resources, and to engage his school in projects, collaboration, partnerships.

The types of learning activities carried out in the SEI laboratories cover a more large and diverse area than in the traditional teaching system, especially with regard to the development of skills required by the guidelines of education for the knowledge society. Therefore, there are many sequences of individual work, cooperative and collaborative activities, problem-solving tasks, tasks for editing, Internet browsing, exploring and creation, product/document presentation, report etc.

This extremely large range of curricular activities offers new possibilities for teachers to know better their students, and to involve them in stimulating extra-curricular activities: projects, collaboration with other schools, participation in competitions, publications, initiating contacts with the issues of local communities. This openness of the horizon beyond the limits of the formal curriculum may be a valuable starting point for school counselling and students’ professional pre-orientation.
4. The school managers’ and teachers’ opinions converge, although with some minor differences, with regard to the impact of ICT on beneficiaries. They think that the main beneficial effects of using the SEI laboratories are the facilitation of the design activities and of the educational process, the assessment of learning outcomes (for students) and the cooperative learning/the development of team work abilities (for students). We should mention the impression of headteachers’ optimism with regard to the potential of the new technologies for attracting students, developing their interest in studying and, implicitly, improving school achievement, as a counterpart to the main argument formulated by teachers – the facilitation of the understanding of subject contents.

Underlying the positive impact of ICT on school achievement, more than 50% of the teachers included in the sample consider that ICT has a substantial contribution to differentiated education, mentioning also that more effort is needed for the development of appropriate tools. At the same time, we should say that more than one tenth of the students encounter difficulties when interacting with subject specific software due mostly to their low training level. We also remark the opinion (expressed by almost as many students as for the one before) that working/interacting with the software not only does not help weak students at all, but it rather confuse them.

Among the difficulties encountered by teachers during lessons in the SEI laboratories, besides the main, general problem of “insufficient computers/laboratories”, there are also in order:

- a) insufficient time for preparing the lesson/test;
- b) insufficient educational software;
- c) specific training in the use of ICT.

In students’ view, the inconveniences with these lessons are ranked as follows:

- a) insufficient time for interacting with the computer/software;
- b) more students working on a computer;
- c) the characteristics of some work tasks;
- d) some software graphics (low clarity of pictures, inappropriate colours and fonts).

4.2. Recommendations

The integrating elements (synthesised in the Conclusions) and the anecdotic sequences (detailed in the Annexes) can represent landmarks for different solutions based on the concrete characteristics of each situation.

Considering that the SEI Programme is a product of the education policy promoted by the Ministry of Education, Research and Youth, we think that the recommendations resulting from the investigation into the implementation of the programme should be placed at the same level, offering to the ministry suggestions for measures/actions which will open new ways/opportunities for increasing the efficiency of the education process and linking up Romanian education with the European reference framework.

1. **The development of a coherent strategy for the computerisation of education** – under debate organised by the Ministry of Education – the most urgent action at the moment, can be successful only if the reference framework is clearly formulated, and suitable to be translated in operational measures, without ambiguities and without labile limits of its scope. This means that the main document of educational policy should define in a clear way the goals to pursue, the strategies and the resources which will be used in order to meet the established objectives. The computerisation of education being one of the strategies for reaching the goals, any major decision should be guided by the essential elements of the education policy.

   This is particularly important in this difficult period, when the education system is confronted on one hand with the shift in the educational paradigm from teacher/teaching-focused to student/learning-focused, and on the other hand with the linking up with the EU education coordinates.

   A detailed formulation of a fundamental document of education policy would allow the re-thinking of syllabuses and curricular documents following an appropriate vision both with regard to subject contents, and the typology of student-content-teacher interaction, also outlining the ICT mission in the knowledge-building process.
The development of a complex strategy for the computerisation of the education system can be done only in congruence with the positions/principles formulated in these documents.

2. The second urgent action at the moment is the pedagogical re-professionalization of teachers. Besides the general initiation in the use of computers and the specific one for the use of the SEI laboratories, which involved a large number of educators, their experience being visible in the various ways they adjust the educational software to the particularities of their school/classes, the new strategies determined by the requirements of student-centred education which should facilitate students’ building of their own knowledge as well as trans-disciplinary or social skills (such as collaborative abilities), imply a new vision of the educator’s roles, roles for which they are not ready yet. Only when teachers are aware of the difference between teaching-focused and learning-focused education and only when they will design a strategy for the student-content-resources interaction based on a validated position for knowledge-building, the potential of information and communications technologies will be achieved.

In order to reach this desired state, there is a need to develop (by an expert group – pedagogues, psychologists, sociologists, computer science specialists, and teachers) a hierarchical structure for the issues, actions and necessary resources for solving each problem. A public debate will bring us closer to possible solutions.

3. With regard to the pre-service teacher training, it’s necessary that all institutions that train education staff – kindergarten teachers, primary and secondary education teachers, school managers – include in their syllabuses sufficient courses related to the issues of the change in the educational paradigm, the use of ICT and the new roles of educators. The best solution would be a common curriculum (with the EU documents as reference for the skills to be developed), with particular versions for 3-4 types/levels of institutions.

Reconsidering the entire range of education issues at a national level and the development of fundamental documents of education policy based on the realities of the present and the requirements of the future could provide a coherent framework for investigative actions (particularly for research & development), for the experimentation, validation and implementation of specific solutions for the student population.

At the same time, the coherent framework of education policy fundamental documents could be a landmark and a criterion for solutions, initiatives, local actions, facilitating the establishment of development strategies by school managers.

REFERENCES


