# THE ICT UTILITY AS MEANS OF INSTRUCTION. TEACHER- AND LEARNER-ORIENTED PERSPECTIVES

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***Abstract***

*A current issue of teachers' continuous training in the Romanian secondary education is the identification and coping with the main problems they face during the teaching-learning-assessment activity in the classroom, from the perspective of the development of digital skills and using information and communication technology (ICT).*

*Access to adequate ICT infrastructure is one of the most important factors contributing to the effective use of information technologies in all subjects and for all students. However, some infrastructure problems persist and these are hindering the integration of new technologies into teaching and learning.*

*By transforming teaching and learning, ICT is considered to contribute to the acquisition of basic – or key – competences.*

*The use of ICT by teachers can have various benefits, which may even be increased if students themselves are enabled to use ICT in the learning process.*

*Teaching staff are the key players in strengthening and fostering the new digital environment in schools.*

*This study is part of a training needs analysis, which aims to establish a professional training programme for teachers in primary and secondary education from the perspective of ICT implementation in teaching, and to improve students' learning process.*

***Keywords:*** *ICT utility; ICT in teaching; ICT in learning.*

## 1. Rationale

The legal basis for teachers' continuous training in primary and secondary school, in ICT, focused on European Commission reports on the use of ICT as a means of training teachers and of problem solving or learning for students, as well as on Ministry of National Education (MEN) Strategies related to digital literacy by investment in infrastructure and provision of schools with IT technology, teachers' initial and continuous training with the purpose of e - learning and conducting media (educational software) to facilitate students' learning.

The compliance with education policies at the European level is ensured by the pursuit of some goals set by the Memorandum of European Commission on Lifelong Learning (adopted in October 2000), which guides continuous professional

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training by "training and improving competences, high investments in human resources, providing lifelong learning opportunities, as close to the beneficiaries, in their own communities and supported by IT equipments" (IȘE, 2015, p. 18).

A report issued by Eurydice in 2011, called K*ey-data on learning and innovating through ICT in European schools*, caters an important set of indicators and insights that can support factors of political decision in their efforts to evaluate and increase the impact of ICT use in learning. Generally speaking, students are encouraged to use ICT in schools, in classroom and for complementary activities.

A defining characteristic of educational policies is providing technology and modern infrastructure in schools. The target groups for these measures in all countries are students and teachers in primary and secondary education, and policy areas, relevant in this respect, are e-learning, providing digital and media literacy, ICT implementation in schools and e-inclusion. In most countries ICT training measures for schools usually cover several of the topics above. However, in Romania in just one or two topics the training measures are covered.

In Europe, the guiding official documents suggest that students should use ICT for learning in the classroom and/or for complementary activities, such as homework or projects.

The recommendations/suggestions are very similar for primary and secondary levels, though complementary activities are, probably, promoted more at lower secondary level and upper-secondary education (high school) than at the primary level.

Students use ICT as related to other disciplines (science or humanities). However, in several cases, there aren't or there are some central recommendations/suggestions about using ICT by students or as support for schools at the primary level in Romania.

The European Computer Driving License – ECDL (European Computer Driving License- ECDL Foundation, 2010) is the certifying system for computer literacy provided by ECDL Foundation. Getting ECDL certifies knowledge of seven groups of skills and competences in computers, it addresses teachers, and the qualification is available for some groups of students.

## 2. Description of the research conducted

### 2.1. Purpose and objectives of the research

The purpose of the research is to ascertain the application degree of ICT by teachers and students in lower secondary school, in teaching from the perspective of a substantiating thematic training programme.

The objectives of the research were to identify the main problems related to ICT infrastructure in schools, the ICT application in teaching, by disciplines (considered to be) favoured by ICT application, and the ICT impact on teaching.

The research was directed towards users, its design being extensive (as shown by the structure of the sampled population), but also intense (with the purpose of

prioritizing results). In this respect, we selected documentary model which focused on collecting, processing, analyzing and interpreting data with respect to:

- ⇨ The ICT infrastructures in schools,
- ⇨ Difficulties in using ICT in teaching,
- ⇨ Disciplines (considered to be) favoured by ICT use,
- ⇨ The ICT impact on teaching,
- ⇨ The ICT impact on students,
- ⇨ The ICT impact on teachers,
- ⇨ Directions of improvement and development of using ICT in teaching of teachers in primary and secondary school.

**2.2. Description of instruments used in research**

Important information was gathered by *questioning teachers of primary and secondary education* in Craiova, Dolj County, and neighbouring areas (urban and rural).

The selective research (based on sampling) was conducted during the school year 2016-2017, the sample used was selected using probabilistic and representative criteria, targeting teachers in Craiova, Dolj County, and neighbouring areas (urban and rural), according to background, the subject taught, position, academic degree and teaching load (primary and secondary school).

In terms of sample size/specificity, we believe that the research shows coherence and consistency within the dimensions of sampled categories.

The target group consisted of teachers of primary and secondary school, in Craiova, Dolj County, and neighbouring areas, primary school head masters, methodologists with the Dolj School Inspectorate, and Teaching-Staff Resource Centre, school inspectors (members of the Curriculum Development Department).

The questionnaire applied for identifying training needs included 17 items (with multiple choice, open-ended questions and the respondent identification).

The deployment implied volunteer personnel management, the aspects of administering, validity, fidelity and objectivity being analyzed by the author.

The research sample consisted of a total of 136 teachers in secondary education: pre-school, primary, secondary and high schools in Craiova, Dolj County, and neighbouring areas.

Regarding the characteristics of those who accepted to answer, we mention the following (Table no. 1):

- ⇨ Teachers questioned/surveyed belong to the following age groups: 5.9 % - 21-29 years old, 33.8 % - 30-39 years old, 36.8 % - 40-49 years old and 23.5 % - over 50.
- ⇨ The respondents' belonging to the urban area prevails, which is also explained by the easy access to Internet (given that the administering of the research instrument and data collection were on line).
- ⇨ Over half of the respondents are teachers holding the 1st Teaching Degree, 26.5 % teachers - the 2nd Teaching Degree, 19.1 % - holding the Definitivat, and 1.5 % -inexperienced teachers.
- ⇨ The average age in education is 17 years old. Female population represents 76.5 % and the male population – 23.5 %.

**Table no. 1. Distribution of teachers participating in the research**

| Variables | Percentage |
|---|---|
| **Age groups** | |
| 21-29 years old | 5.9 % |
| 30-39 years old | 33.8 % |
| 40-49 years old | 36.8 % |
| 50 or more | 23.5 % |
| Teaching area | |
| Urban | 73.5 % |
| Rural | 26.5 % |
| **Teaching grade** | |
| Inexperienced teachers | 1.5 % |
| Definitivat teachers | 19.1 % |
| 1st Teaching Degree | 26.5 % |
| 2nd Teaching Degree | |
| **Gender** | |
| Male | 23.5 % |
| Female | 76.5 % |

⇨ The age of the students of these teachers ranges between 10 to 14 years (for almost half of the questioned teachers), followed by the age of 14-18 for almost 40 % of them.

### 3. Data synopsis

***ICT infrastructure in schools***

⇨ 89.7 % of teachers claim that there are computers available to students, but only 50 % of the teachers state that school provides the necessary number of computers for their activity.

⇨ Teachers probably find additional ways to use computers, especially since preparing lessons (planning, design, updating teaching content) takes place mostly at home. Teaching intensification and administrative activity in recent years do not provide time opportunities or space for preparing lessons on the premises of the school.

**Table no. 2. Equipping schools with computers**

| Issues related to school infrastructure | Percentage |
|---|---|
| **Does your school provide computers?** | |
| Yes, for students | 89.7 % |
| Yes, for teachers | 54.4 % |
| No | 1.5 % |
| Has the intention to introduce | 1.5 % |
| **Do you use computers as part of classroom activities?** | |
| Yes | 94.1 % |
| No | 5.9 % |
| **If yes, is a:** | |
| Desktop (for each student) | 15.6 % |

| | |
|---|---|
| Desktop (for more students in a regular classroom) | 28.1 % |
| Desktop (for more students in a computer lab) | 51.6 % |
| Laptop (individually) | 0 % |
| Laptop (for more students in a regular classroom) | 21.,9 % |
| **Do you agree that each student should be provided with a laptop as a personal learning instrument?** | |
| Yes | 85.5 % |
| No | 14.5 % |

⇨ The most frequent situation (more than half of the cases of ICT use) is that of the use of the computers by more students in computer lab which exists in most schools. There is also the situation of the use of the computer/desktop or laptop by more students in the classroom (28.1 %).

⇨ Pupils' individual use of their own laptop is unrealistic taking into consideration the socio-economic conditions in Romania. However, more than 80 % consider it necessary to provide every student with a laptop (1:1 computing), due to its qualities: ease of use, portability, enabling customization of the workspace, etc.

⇨ The lack of equipment is one of our school reality, that is why we are sceptical about effective training in the context of the twenty-first century without the implementation of the principle "one student – one computer".

**Difficulties in the ICT use in teaching**

One vulnerable point of using ICT in our country is also confirmed by this study (Table no. 3):

⇨ Designing and providing the educational software is unsatisfactory for 30.9 % of teachers, either because of insufficient initiatives in creating educational software, or because there are difficulties concerning its purchase and distribution, both related to costs. Moreover, software customization by teachers is still considered an extremely complex procedure and hard to achieve.

⇨ In the identification of the obstacles of ICT use, as they appear in teachers' opinion, a surprising percentage of the respondents (25 %), consider that they encounter resistance from school. This indicates the heterogeneity of the views on the computerization of education, though applied research from the last years speak of its obvious benefits.

⇨ The following causes, in order of their importance, point out to the external problems, which are either technical or financial. Though in recent years there have been made considerable efforts to introduce ICT in the teaching-learning strategies, problems are far from being resolved, given the various factors that influence them, from providing the material to the formative dimension of teachers' specific training.

**Table no. 3. Barriers in the use of ICT in teaching**

| | |
|---|---|
| (a) Lack of access to technology (hardware) | 16.2 % |
| (b) Misunderstanding of the way technology can be used in teaching (training) | 8.8 % |
| (c) Lack of confidence in using technology in the classroom | 5.9 % |

| | |
|---|---|
| (d) Lack of funds available for purchasing technology | 22.1 % |
| (e) Lack of connectivity (internet, broadband, etc.) | 23.5 % |
| (f) Lack of security (capacity to restrict the content) | 10.3 % |
| (g) Lack of IT support in schools that could be efficiently used | 19.1 % |
| (h) Resistance inside school | 25 % |
| (i) Resistance from parents | 1.5 % |
| (j) Lack of content/ software appropriate for teachers | 30.9 % |
| (k) There is no interest | 10.3 % |

***Disciplines advantaged by ICT use***

According to the teachers surveyed, school subjects benefiting mostly from the "virtues" of computerization are (Table no. 4 and Figure no. 1):

1. Sciences (physics, chemistry or biology) as indicated by 59.7 % of the respondents;
2. Foreign language (57.4 %)
3. Geography (50 %).

It can be noticed that the subjects listed opportunities of graphic organizing offered by the new technology. The computer allows modeling some physical or chemical phenomena which take place in difficult conditions; it proves to be helpful in the exploitation of a pattern within which some elements are variable parametres and modify intrinsic qualities. The computer can simulate experiments effectively, without substituting lab work, contributing to a better understanding of the surrounding reality. Among the disciplines for which the utility of the technological support is not fully confirmed, the respondents have chosen, as expected, physical education (47.5 % of the teachers considering that ICT is completely ineffective).

Percentage distribution of the teachers per answer to the item of computer efficiency for student learning in different subjects:

**Table no. 4. Disciplines advantaged by ICT use**

| How do you appreciate the computers efficiency for student learning in the following subjects? | Percentages per answer version | | | | |
|---|---|---|---|---|---|
| | 1=completely ineffective | 2 | 3 | 4 | 5 = very effective |
| Mathematics | 6.6 % | 3.3 % | 21.3 % | 31.1 % | 37.7 % |
| Sciences (physics, chemistry, biology) | 0 % | 1.6 % | 4.8 % | 33.9 % | 59.7 % |
| History | 0 % | 6.7 % | 25.0 % | 33.3 % | 35.0 % |
| Geography | 0 % | 1.6 % | 16.1 % | 32.3 % | 50.0 % |
| Native language | 3.3 % | 20,0 % | 25,0 % | 30.0 % | 21.7 % |
| Foreign language | 0 % | 3.3 % | 9.8 % | 29.5 % | 57.4 % |
| Physical education | 47.5 % | 27.9 % | 19.0 % | 3.3 % | 3.3 % |

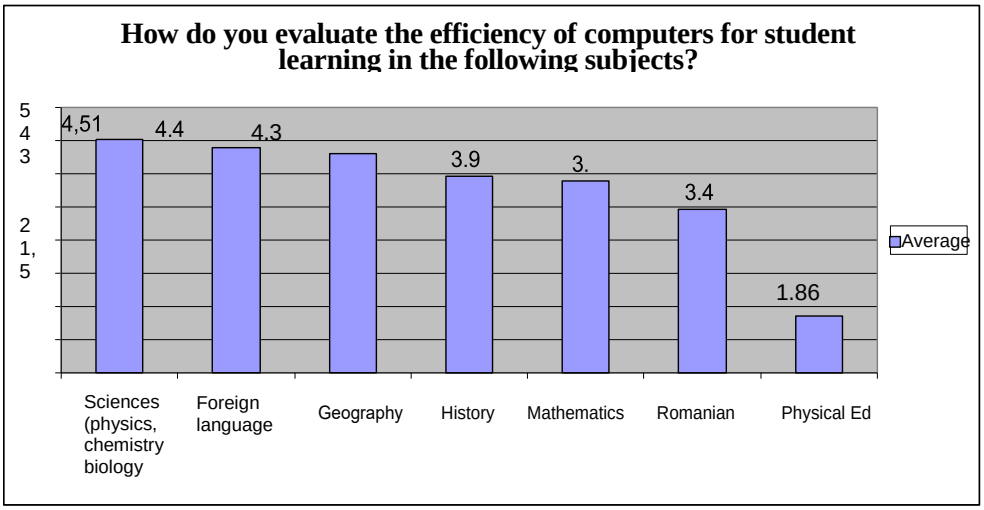


**Figure no. 1. Teachers' opinion on computer efficiency in school subjects**

**The impact of ICT on education** has been the topic of mainstream research, the emphasis on the positive impact being obvious. The analysis of the results (the percentages of alternative response) indicates that (Table no. 5 and Figure no. 2):

⇨ Computers are particularly useful for adapting learning activities for students with special needs or learning difficulties (the average of the responses: 3.18);

⇨ Computers in the classroom facilitate teaching (the average of the responses: 3.12);

⇨ Classroom technology had no impact on my teaching activity (the average of the responses: 3. 09).

It seems interesting to analyse the following statement: "Classroom technology had no impact on my teaching activity". A possible explanation would be that teachers often believe that the personal factor is responsible for the teaching manner and style, and not the procedural technology.

**Table no. 5. The impact of ICT on education**

| *How has the use of the computers changed your teaching activity? Which of the following statements do you agree with?* | Percentage per answer | | | | |
|---|---|---|---|---|---|
| | 1 = strongly disagree | 2 | 3 | 4 | 5 = totally agree |
| Computers in the classroom facilitate teaching. | 33.9 % | 6.5 % | 12.9 % | 6.5 % | 40.3 % |
| Computers in classroom allow me to better adapt my lessons to each student individually. | 25.8 % | 14.5 % | 16.1 % | 14.5 % | 29.0 % |
| Computers are particularly useful for adapting learning activities for students with special needs or learning difficulties. | 20.0% | 13.3% | 23.3% | 15.0% | 28.3% |

| | | | | | |
|---|---|---|---|---|---|
| Technology helps me achieve a balance between teacher-centered and student-centered approaches. | 33.3 % | 12.7 % | 9.5 % | 11.,1 % | 33.3 % |
| Technology in the classroom had no impact on my teaching activity. | 35.8 % | 9.4 % | 9.4 % | 0 % | 45.3 % |
| Technology helps me achieve mandatory levels/ share content with colleagues. | 28.6 % | 16.1 % | 19.6 % | 23.2 % | 12.5 % |

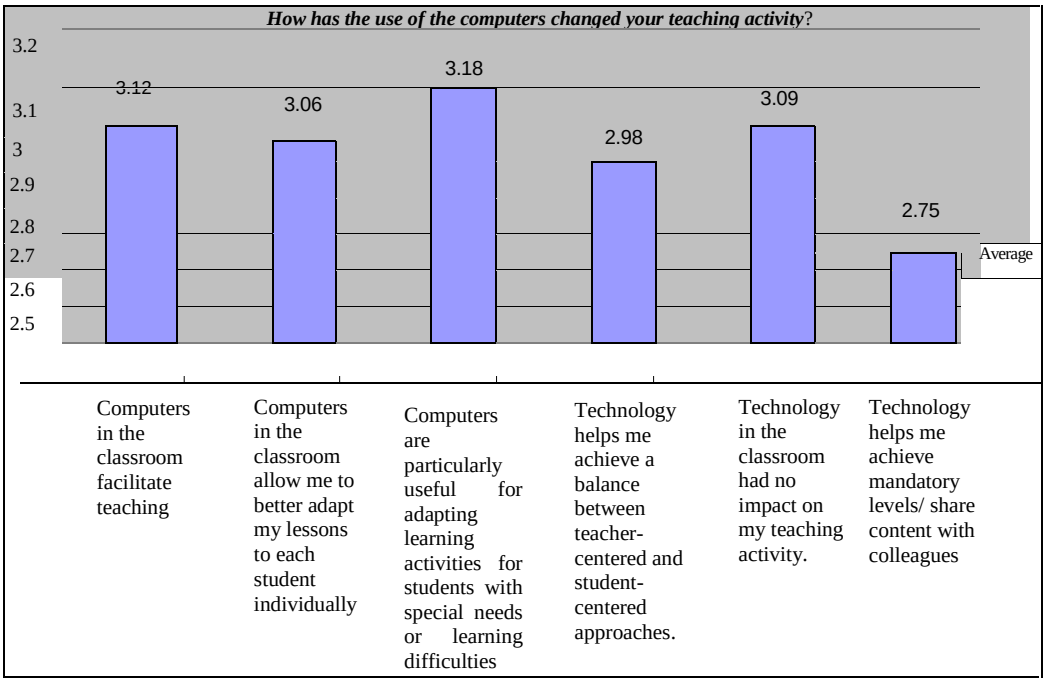


**Figure no. 2. The impact of ICT on education**

***ICT impact on students***

Further on we seek to highlight the ICT impact on teachers and students. Changes in the intellectual and socio-emotional behaviour of the students are materialized such as (Table no. 6):

- ⇨ Increasing learning interest;
- ⇨ Increasing class attendance;
- ⇨ Attaining a better focus;
- ⇨ Fostering teamwork;
- ⇨ Improving school performance;
- ⇨ Developing communicative skills;
- ⇨ Project management optimization;
- ⇨ Developing problem solving skills.

**Attitude register** is noticed by the respondents to be amended to visible positivity (average of 3.64). Identical percentages showed the following aspects:

- ⇨ Increased interest in learning;

⇨ Increased class attendance;
⇨ Better school performance.

In psychological and pedagogical terms, the three are in a direct causal relationship (causal chain: increased interest triggers class attendance, which, in turn, can optimize school performance).

**Table no. 6. ICT impact on students**

| *Which of the following behavioral changes have you noticed as a result of the use of the computers in the classroom?* | Percentages per answer version | | | | |
|---|---|---|---|---|---|
| | 1 = strongly disagree | 2 | 3 | 4 | 5 = totally agree |
| A higher interest in learning | 14.1 % | 10.9 % | 14.1 % | 23.4 % | 37.5 % |
| Increasing class attendance | 15.6 % | 12.5 % | 7.8 % | 26.6 % | 37.5 % |
| Attaining a better focus | 4.8 % | 19.0 % | 15.9 % | 30.2 % | 30.2 % |
| Fostering teamwork | 20.6 % | 9.5 % | 12.7 % | 22.2 % | 34.9 % |
| Better school performance | 8.2 % | 9.8 % | 24.6 % | 26.2 % | 31.1 % |
| Improved communicative skills | 14.3 % | 12.7 % | 22.2 % | 28.6 % | 22.2 % |
| Better project management | 14.5 % | 17.7 % | 11.3 % | 22.6 % | 33.9 % |
| Increased problem solving skills | 11.3 % | 12.9 % | 21.0 % | 24.2 % | 30.6 % |
| A more positive attitude in the classroom | 14.1 % | 14.1 % | 6.3 % | 25.0 % | 40.6 % |

***ICT impact on teacher***

⇨ As regarding teachers' perception of their own level of efficiency in ICT use, more than half (54.7 %) see themselves confident in computer competency.

⇨ A percentage of 39.1 % need mentors in computer use, known being the fact that students master technology from an early age.

**Distribution of teachers' answers to the item regarding the level of efficiency in the ICT use**

**Table no. 7. ICT impact on teacher**

| Do you think you know more about the effective use of the computer than your students? | Percentages |
|---|---|
| Yes, I am competent and I know more than my students. | 54.7 % |
| Yes, I am familiar with the computer and know as much as my students. | 25.0 % |
| No, I cannot manage to use a computer and I know less than my students. | 1.6 % |
| Though I can manage my computer knowledge; my students know more than me. | 12.5 % |
| Though my students know technology better, I can teach them how to use computers and internet very well | 39.1 % |

**4. Drawing the program conclusions**

Sampling has theoretical value, research being directed towards its purpose, and not to the targeted population. Nevertheless, representation within the educational environment offers general theoretical insights, also being a useful tool that can be replicated in other contexts.

In terms of sample size/representativeness, we consider that the research has coherence and consistence within the sampled categories.

- The research has underlined teachers' interest in professional training in ICT use in teaching, that is why it is appropriate widening the target group through integration to the teachers' continuous training programme, of the teachers in the rural area, but also at the pre-school and primary level.
- The presence of the school headmasters in the target group brings added value from the inter-learning perspective.
- Equally, the variable "having knowledge and the use of IT technology" cannot be considered a criterion either in favour or against the selection of target group.
- Added value of such a continuous training programme should be offered by the development of proactive attitudes towards ICT use as an instrument for teaching efficiency.
- The applied aspect should take priority over theoretical approaches, and within didactic communication, the students' feedback should orient trainers.
- The level of curricular integration should be cross-thematic.
- The curriculum for primary school ($1^{st}$-$4^{th}$ grades) has been recently revised and, in April 2016, a new framework for secondary school was published ($5^{th}$-$8^{th}$ grades).
- The new curriculum emphasizes the applicability of knowledge and skills development in an integrated, interdisciplinary approach.
- ICT education has been enhanced (with 1 hour per week).

Educational policies in the area of teachers' continuous professional training should take into account the differences that exist in education, regarding the average number of pupils making up the group size in the classroom.

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