THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AS A TEACHING METHOD IN VOCATIONAL EDUCATION AND TRAINING IN TOURISM

Elena Mădălina Mocanu (Dedu), Alecxandrina Deaconu

Abstract: Globalization and technological change that have characterized recent years have created a new global economy powered by technology, fueled by information and knowledge, with serious implications for the nature and purpose of education institutions.

Effective integration of ICT into the education system is a complex, multilateral process that involves not only the presence of technology, but also a corresponding curriculum, institutional availability, teachers' skills development, long-term funding.

This article explores the use of ICT tools in vocational education and training in tourism, proposing concrete ways to use new technologies in teaching-learning-evaluation of disciplines in the field of Tourism and Food. The research was carried out on a sample composed of high school students from Constanta County, Romania, and we used the psycho-pedagogical experiment as a research method. The results of the analysis confirm the initial hypothesis that the use of ICT, as a teaching method in tourism classes, determines, among pupils, the formation and development of specific skills to a greater extent than the use of traditional methods.

Key words: Information and Communication Technology, Vocational education, Innovation in education, Computer software, Tourism

JEL: D83, I21, O30, L86, L83

1. Introduction

Information and Communication Technology has become an important aspect of modern life. Involvement in various fields of activity (education, pursuit of a profession, leisure, etc.) has become largely dependent on the possibility of using the various technologies.

The term *Information Technology* was first used in 1958 in an article published in the Harvard Business Review by Leavitt and Whisler: „ the new technology does not yet have a single established name. We shall call it *information technology*." [7]

Information and Communication Technology can be defined as a diverse set of tools and resources used to communicate and to create, disseminate, store and manage information.[1] These technologies include computers, the Internet, radio broadcasting (radio and television) and telephony technologies.

Information and communication technology consists of three main categories: *Information technology* - refers to computers that have become indispensable for today's society to process data and save effort and time; *Telecommunications technology* - includes telephones and radio / TV transmissions; *Network technologies* - the most popular of which is the Internet, but have also expanded in the field of mobile telephony, Voice Over IP (VOIP), satellite communications, and other forms of communication still in development. These new technologies can not operate isolated from one

another, and the development of the Internet has led to an interleaving of these technologies, making the Internet a central point. [10]

According to the European Commission[2], the importance of Information and Communication Technology lies less in the technology itself, especially in its capacity to allow greater access to information and communication among the population served. Many countries around the world have set up ICT-promoting organizations as a means of reducing the digital divide created between the technologically developed and less advanced areas.

The technology has recently produced a series of changes in the way communication is made and in the ways in which social and personal activities take place. The use of Information and Communication Technology has produced a multitude of benefits for the development of society but, at the same time, has created a number of problems that seem to be growing with the improvement of technology. However, to be applied, technology must demonstrate a global benefit to mankind.

2. Use of Information and Communication Technology in Education

In most countries in Europe, the use of ICT tools in the educational process has become crucial in order to modernize services, improve teachers' skills and increase student performance. The transformation of the Romanian society into an information society and the development of informatics required a thorough and diversified training of the young people in this field.

Different stakeholders in society (authorities, parents, business community, pupils, learners, students, etc.) are increasingly urging the education sector to consider integrating Information and Communication Technology (ICT) into the classroom, taking into account the rapid process of transforming society into a knowledge-based society in which the use of technology has become a core competence.

ICT tools used both in education and society are in constant change, and studies in this field can barely keep up with this technology development. Thus, most ICT reports and publications were written at the beginning of the 21st century when Web 1.0 technologies were used. Over time, Web 2.0 applications have appeared and developed, and in the period 2010-2020, it is expected to switch to Web 3.0, technologies for which there are less information and studies.

Information and Communication Technology is a set of tools that have a great capacity to expand educational opportunities, both formal and informal, beyond the areas served so far, namely among rural and dispersed populations, within groups traditionally excluded from education, for cultural or social reasons (ethnic minorities, women, disabled or elderly) among all those who, due to costs or time constraints, have been unable to join the education system.

A defining feature of Information and Communication Technology refers to its ability to transcend time and space, making possible the asynchronous learning or learning characterized by a gap between the time of delivery and the receipt of study materials. In addition, some types of ICT, such as teleconferencing or videoconferencing, make it possible to receive study materials simultaneously by several learners in different geographic areas.

Information and Communication Technology can, to a great extent, support the revival of the educational process, but teaching methods do not automatically improve due to the ICT implementation in the classroom. It is necessary for ICT to be embedded in the educational process in a careful, balanced way, the benefits of ICT being achieved especially when attention is paid to the entire educational environment and not only to technology as a medium for the transmission of information.[12]

Achieving innovation in education through Information and Communication Technology is realised taking into account the range of educational opportunities available that offer various opportunities for ICT use within this system.

- Firstly, ICT can be used in education as *a tool* by which teachers can create an electronic agenda, an electronic monitoring system for students, or they can search for information to

prepare lessons, and students can make attractive presentations or communicate with each other or with the teachers.

- In addition to its utility as a tool, ICT offers many other possibilities for use in education, giving rise to additional benefits. Thus, education can become more *flexible* by separating the learning process in time and space, that is, by making it out of the classroom, which may be for to adults eager to study outside the daily education system, at work, the benefit of sick children for a long period of time or people with disabilities. Due to its flexibility, the eLearning system can increase people's involvement in lifelong learning.

- Also, the flexibility of education can offer a *differentiated treatment* more efficient to students with different levels of initial knowledge or greater flexibility in the learning process. The e-learning environment involves the use of software that combines a number of presentation and communication options (virtual classes accessible to both teachers and students) with learning articles (courses, exercise examples, tests) that the learners are studying at their own pace or within heterogeneous groups in terms of their initial level of knowledge.

- The key opportunity is to use ICT as a *catalyst* for innovation in education. Multiple applications, such as online forums, blogs, games, or online tests, are suited to the perspective of a learner-centered learning process that focuses on learning and less on teaching, and the teacher has an intermediary role, as a mentor of the trainee in his self-training activity.[12]

3. ICT methods and tools used in vocational education and training in tourism

Improving the quality of vocational education and training is a major problem at a time of expansion of education and Information and Communication Technology can also successfully contribute to solving this problem through various ways: increasing the motivation and commitment of learners, facilitating the acquisition of basic skills and enhancing teacher training.

In terms of students' motivation for learning, the different technologies that combine text, sound, color, moving images can be used to provide authentic and interesting materials designed to attract and engage the learner actively in the learning process. Using computers connected to the Internet can increase students' motivation because it offers the opportunity to connect with other people and participate in different events in the real world. [11]

Computer-assisted training has become increasingly one of the basic didactic methods in modern education. Along with the teacher and student, the computer has become the third important player in the educational process, along with the other two ensuring the success of the teaching process.

The introduction of Information and Communication Technology in educational activity has a strong influence on didactic strategies and on the forms of learning organization, the learning act being transformed from the effect of the teacher's activities in the result of the interaction of pupils with the teacher, the computer and the sources of information.

In order to achieve the development of teachers' competences, the introduction of Information and Communication Technology in the educational activity must go through the following stages: [4]

- Substitution - the accidental use of new technologies, along with the use of traditional teaching methods;

- Transition - new technologies are being used at the same time as traditional methods;

- Transformation - new technologies are used instead of traditional methods, becoming obsolete

The ICT tools that can be used in education are many and in the literature there are different ways of classifying them.

Thus, in the Teacher's Guide on Using ICT for Educational Activities, the Ministry of Communications and Information Society of Romania specifies that the ICT tools used in the teaching activity are different depending on the type and purpose of the training activities and can be divided

into four categories: a) Information ICT tools; b) Location ITC tools; c) ICT tools for building knowledge; d) Communication ICT tools.[4]

a) Information ICT tools - Are those tools that enable students and teachers to access a large amount of information presented in different formats (text, images, graphics, audio, video, etc.) required in both didactic and extra-curricular activities. They can be seen as very large deposits of information in a passive form, available to all users: multimedia encyclopedias, different web resources, etc.

These means aim at training, on the one hand, the skills to search, select and use information available on different web sources, and on the other hand, the skills to create electronic materials in different formats.

To train the competencies to *search, select and use information,* pupils can use many sites for study topics or online encyclopedias, by accessing of which, students form the following skills:

- Identifying, accessing and collecting information on the Internet;

- Using the various techniques and tools for accessing and processing information: navigation programs, search engines, effective search strategies, files and directories;

- Using the real, quality information corresponding to the study topics.

For the creation of electronic materials it is necessary to use editing tools in different formats. By working with these tools, students form and improve the following skills:

- Making multimedia presentations in attractive and exciting forms;

- Using the different technologies, software applications to create information;

- Collaborating with other users to create blogs, wikis and forums;

- Using tools to share information with other users.

b) Location ICT tools - are those methods that place the student in a virtual environment where he experiences simulated situations similar to real ones: simulations, virtual games etc. There are many online applications appropriate to learning activities that meet the student's experiential learning needs. The simulations contain the description of the real phenomenon or situation, guide the actions of the pupils, propose real situations that pupils have to solve and specify the level of knowledge that students have at the end of the lesson.

Location ICT tools can be simulators, online games, virtual encyclopedias, their use leading to development of the following skills:

- Using interactive applications;

- Participating in experiential learning activities;

- Using online applications that allow access to virtual and simulated learning situations.

c) ICT tools for building knowledge - include the set of tools used to manipulate the information accessed to produce their own materials needed in the learning activity. These can be materialized into personal webpages through which students and teachers can communicate their own ideas, online portfolios with different products produced by their own actions, online self-evaluation tools.

The use of these tools has the purpose of forming and developing the following skills:

- Creating, maintaining and continuously expanding the online learning portfolio;

- Using online discussion forums;

- Participating in various school debates by videoconferencing, etc.

d) Communication ICT tools - are these tools that provide students with the posibility to communicate, transmit and receive messages on different educational themes, allowing space or time barriers to be overcome.

By using communication ICT tools, students develop skills as:

- Selecting and using the appropriate technologies and channels to initiate and maintain communication;

- Participating active and effective in online forum talks;

- Using correctly and in educational purposes of social networks.

Another classification of ICT tools that can be used in education is found in the course *Information Technology and Communications Technology (ICT) Integration in the National Curriculum - Informatics Disciplines*. According to it, modern technology tools can be divided into the following broad categories: [13]

a) Hardware tools - represents the universal or specialized digital equipment used to carry out the education process. Being used as a digital text provider at the beginning, hardware tools now offer multiple communications, accessibility and multimedia facilities. In turn, hardware tools can be categorized as follows:

- *Presentation equipment* - are those devices that offer the possibility of interactive and passive visual and audio perception of digital information for one or more users: video monitors, interactive displays, video projectors, projection screens;

- *Storage equipment* - are the tools (magnetic, optical, mixed) that allow safe storage of data on small, portable, high-capacity devices: the application server, the data storage server, the communications server;

- *Specialized equipment* - are those devices used to capture images, video and audio sequences, such as scanners, cameras and digital video cameras.

b) Software tools - are represented by digital resources of various types, such as:

- *Passive resources* - There are different text documents, images, sound or video sequences, digital dictionaries on a data medium or in the Network that can be accessed by users. These are characterized by the fact that they are accessed through other specialized software (Google maps, Google Books, Wiki, Dexonline, Google Docs, etc.) without proper, well defined action;

- *Standardized learning objects* - are interactive programs designed to meet international standards, enabling users to perform practical tasks, solve different exercises or tests, etc. Learning objects can be passive models based on content transfer (models with sequential, hierarchical and network structure) and interactive models for interactive learning (models for unique users, universal models and collaborative models);

- *Simulation applications* - are applications that allow users to observe and model phenomena or actions without actually getting involved in their deployment. Educational games are also included here. Example: Virtual Laboratory of Informatics and Information Technology and Communications - http://lab.infobits.ro/;

- *Evaluation applications* - are software products that enable the user to create different evaluation tests and to analyze, preserve and transmit the results of the evaluation to the learning management system. These applications allow the testing of knowledge and can be applied both independently and in a training environment. Examples: Insam platform, Infoarena, .campion, TopCoder, "Evaluator OJI";

- *Learning management system* - are software applications that use integrated databases to keep track of progress, learning efficiency, instructional content, and information on how to use it. The main purpose of an LMS is to ensure the process of increasing knowledge, developing new skills and abilities, and in some cases increasing labor productivity. Examples: NetSupport School, Platforma Oracle Academy, Platforma de e-learning Moodle, Live@Edu, W3Schools, Platforma IT Essentials, AeL etc.

- *Learning content management system* - are software applications for the development, management and subsequent publication of educational resources (content) through LMS. An LCMS is a

common medium in which content creators can develop, store, reuse, manage and deliver learning content through a central repository. Examples: Moodle, Google Docs, Wiki, ZoomIT etc.

c) Communication tools - are represented by the hardware and software tools used to carry out the synchronous and asynchronous communication process. The software tools used for synchronous communication are continually diversifying, the most popular being: Google Talk, Yahoo Messenger, Skype, videoconferencing, chat etc. The most commonly used tools for asynchronous communication are: e-mail, blog, forum, discussion group, storage for documents of various formats (image, text, audio, video) like Slideshare, YouTube, Issuu, etc. The hardware tools used for communication are those that allow the physical transmission of information such as the Internet, communication channels, data servers and network devices, etc.

In the study *Use of information and communication technology in the counseling activity*, which appeared at the Institute of Educational Sciences, the authors propose another classification of the ICT tools used in education: [6]

a) Collaboration tools: Wiki pages, Blogs, Social bookmarking tools, etc.

b) Communication tools:

- *Asynchronous:* Email, Discussion Forum, Virtual Library, Web Sites, etc.

- *Synchronous via Internet*: Chat, Video conferencing, Skype, etc.

c) Social networks: Facebook, etc.

d) Self-promotion tools: CV Video, Personal Website, Prezi, etc.

4. Using Web 2.0 Technology in Vocational Education and Training in Tourism

Also known as social software, the term Web 2.0 is often applied to a heterogeneous blend of relatively familiar and emerging technologies. It refers to the new ways to consider and exploit the organizational possibilities of the web, according to which web information is no longer provided to users only by the media, governments and firms, but also by individuals interconnected between them through Internet networks. This means that users can also contribute and actively participate in the dissemination and sharing of various global information through the web, thus materializing the theory of the web inventor, Tim Berners-Lee: „The basic idea of the Web is that of an informational space where people can communicate in a special way: sharing knowledge. It must not only be a browsing environment but one in which everyone can put their own ideas" [14]

Web 2.0 Technology aims to facilitate creativity, sharing information and collaborating users through social-networking services, wikis, blogs, folksonomies, Video Sharing sites, feeds, Photo Sharing, Slide services Sharing, etc., leading to the emergence and development of web-based communities.

This term became known after the first O'Reilly Media Web 2.0 Conference in 2004.[9] Although it suggests a new version of the Web, it does not refer to updating technical specifications, but how to develop applications and how users use the Web. The concept mainly concerns two important changes. Firstly, switching from the web where the information is only read on the web where it is read and written, including content provided by users (participative web), and, secondly, to the so-called cloud computing. [8]

The participative web assumes that any particular person, institution, firm or school can easily load their own information on the web, in the form of text, photos, video or audio. In this way, the Internet has turned into a real interactive environment, after a long period of time when it has served users only as a source for the passive consumption of information provided by professionals. The new goal of the Internet has become the creation and distribution of content by all the participants in this vast network that has grown at an incredible global pace.

The notion of *Cloud computing* refers to the fact that on Internet servers there are both data and applications that can be accessed by any user from any computer connected to the Internet and

equipped with a browser, thus it is no need to install the Microsoft Office package or another program on the personal computer. In other words, the Internet is becoming more and more a desktop. [8]

Web 2.0 technology offers many tools that can be used successfully in education, various well-known authors considering that Web 2.0 is the future of education. [5] These tools have begun to be used by an increasing number of teachers who have discovered that Web 2.0 technology offers real teaching and learning opportunities.

Using Web 2.0 in education implies access to a variety of tools closely related to this concept, such as: wikis; Blogs and microblogs; Social networks; Social bookmarking services; News feeds (in RSS or Atom format); Services for sharing photo, audio / video (video sharing); Services for creating textual content (Office 2.0), audio and video; Slideshare services.

Using these tools, teachers experience and apply new pedagogical models in practice, and learners have to adapt to the requirements of this new environment in order to benefit from the facilities and opportunities offered.

Web 2.0 is an environment conducive to creative educational efforts, in which almost anyone can become publisher or producer of content and information provider. It is also a place where people connect with other people, exchange ideas, demonstrate their creativity in front of an audience. The Internet has become not only a huge curricular resource, but also an important learning environment for both students and teachers. It is also a place where people connect with other people, exchange ideas, demonstrate their creativity in front of an audience. The Internet has become not only a huge curricular resource, but also an important learning environment for both students and teachers. Web 2.0 provides authentic learning experiences for students and encourages global awareness, creativity, innovation, critical thinking, active participation and collaboration. [3]

Generally, the features of Web 2.0 technology are: Web applications can be accessed from anywhere; simple applications solve specific problems; the value is of the content provided and not of the technology used to display it; information can easily be shared with others; students and teachers can access and use tools individually; these tools provide users with the ability to create, collaborate, edit, classify, change or promote information; encourages the creation and development of a network of more and more people. [3]

5. Methodology

The main research method used in this study was the psychopedagogical experiment consisting in the formation of two samples, respectively the experimental sample and the control sample, the application of the independent variable on the experimental sample and the analysis of the changes of the dependent variables compared to the control sample.

Participants in this study were students from the tourism high schools in Constanta County, Romania, which were grouped on two samples of subjects, respectively the experimental and the control samples, depending on the results obtained at the pretests applied in the pre-experimental stage of the research.

In the case of this research, the experiment consisted in the use of ICT tools as didactic methods (the independent variable) in the experimental classes and the study of the modification of the dependent variables (specific competences) in comparison with the control classes, where classical didactic methods were used.

The research was conducted over three school years in the period 2013-2016, and implied the development of course classes in the field of Tourism and alimentation with the help of various ICT tools, in the classes in the experimental sample, and with the traditional methods, in the control classes.

The data recorded and interpreted in this study were obtained by applying the assessment tests at the end of each unit of learning that was included in the didactic activities. Interpretation of the obtained results was accomplished with the t-Test statistical tool (Microsoft Excel), by which we compared the

experimental class averages with the control class averages, analyzing the effects of the independent variable (the use of ICT methods) on the dependent variable (specific competencies).

6. Conducting of research

The development of this research consisted of four stages, namely the pre-experimental stage, the experimental stage, the postexperimental stage and the retest stage.

In the *first stage*, we determined the existing level of the dependent variable at the time of initiation of the experiment, respectively we identified the initial level of development of the specific competences of the participating students. Depending on the results obtained, we formed the two samples of subjects, namely the experimental and the control ones, the included pupils having a level of skills formed approximately equal.

In the *second stage*, the actual experiment was carried out, which consisted in transmitting the knowledge from the sample of established content to the students participating in the research, using different methods.

In the experimental classes, teachers and students used methods based on Information and Communication Technology, and in the control classes they used traditional and modern teaching methods.

The main ICT method used in the experimental sample was the easyclass.com educational platform, where coordinating teachers created virtual classes for all experimental classes. Other ICT tools used were: www.classtools.net, creately.com, popplet.com, bubbl.us, edu.glogster.com, padlet.com, powtoon.com, drive.google.com etc. These have been introduced at the various moments of the lesson, either for the transmission of new knowledge [15],[18],[20], either for their fixation and consolidation [16],[17],[19], or for the evaluation of those acquired previously.

Activities have been carried out by teachers who usualy teach to the experimental and control classes and who frequently use new technologies in the educational process. The lessons were of different types, aiming at achieving well-defined objectives and training specific skills in accordance with the Vocational Training Standards of each qualification in the field of Tourism and alimentation.

Below, we briefly present these ICT tools and how we used them during classes:

a) Easyclass.com - is a learning management system that gives teachers the ability to create digital classes where they can store materials and course support online, manage classroom discussions, prepare themes, tests and exams, track deadlines, give notes, and provides pupils with feedback, etc. Students can also collaborate with each other, exchange information, or communicate on various topics.

In the present research, at the experimental classes, teachers used www.easyclass.com to create virtual classes of the participating students (Figure 1), where they were able to find documentation in the Library, they could solve different tests or themes, to post various materials, to communicate with each other, to see the notes received in the virtual catalog, etc.
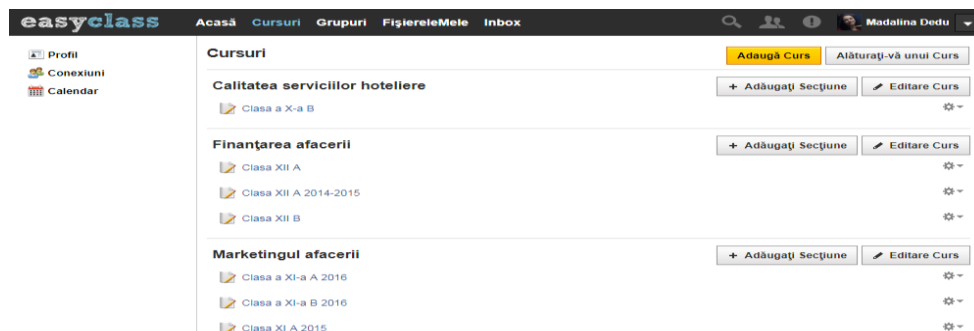

Figure 1. *www.easyclass.com – Crearea claselor virtuale* [25]

b) Classtools.net - is a Web 2.0 tool that allows teachers to create different activities, games for students, study materials, using templates made available by the site. We used this tool to create slides presentations (qwikslides template – see Figure 2) or presentations on a cube's facets (brainybox template) of the information provided.

Figure 2. *www.classtools.net* - *Marketing communication* [18]

c) Creately.com - is a web tool that gives users the ability to create charts, graphs, or logic schemas either using the online version via a browser or downloading the program to the computer. At the same time, it can also be a collaborative tool, more users from different computers creating a graph together.

We used this ICT tool to create lessons' graphs as in the Figure3:
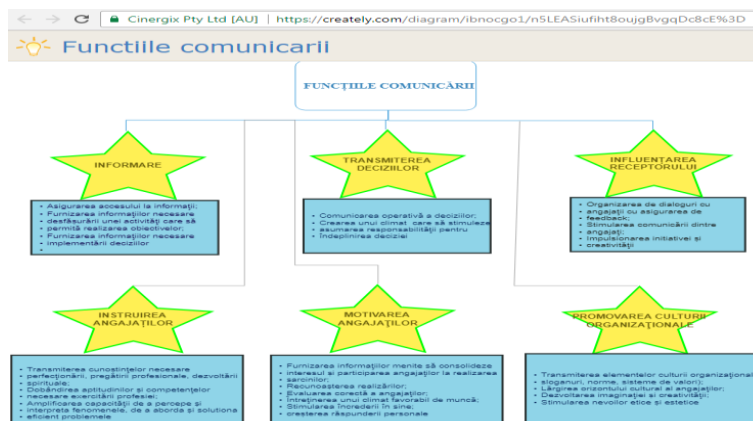

Figure 3. *www.creately.com* - *Communication functions* [19]

d) Popplet.com - is a Web 2.0 tool that allows the creation of maps and schemas in a quick and easy way. Presentations can include images, videos, and texts and can be created collaboratively. Pupils made the scema in the figure 4 using popplet.com.
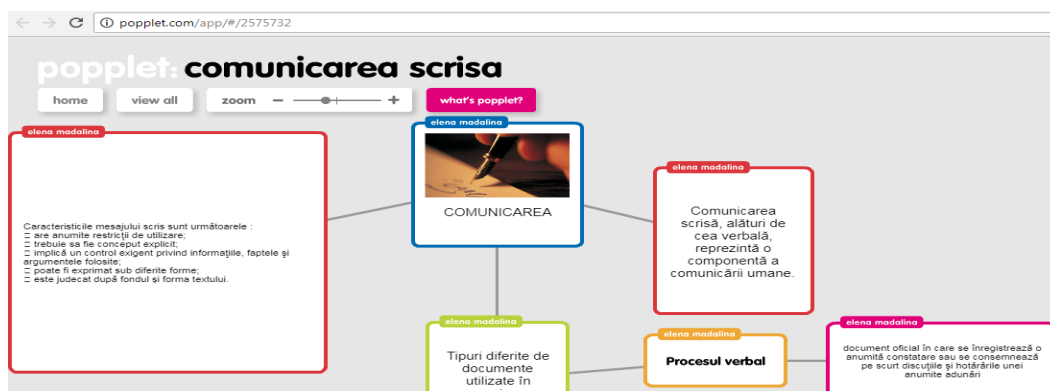

Figure 4. *www.popplet.com* - *Written communication* [22]

e) Bubbl.us – is a web 2.0 tool used to structure information, to create mind maps for better understand, remember and generate new ideas. We created a lesson plan with students using this tool (Figure 5)
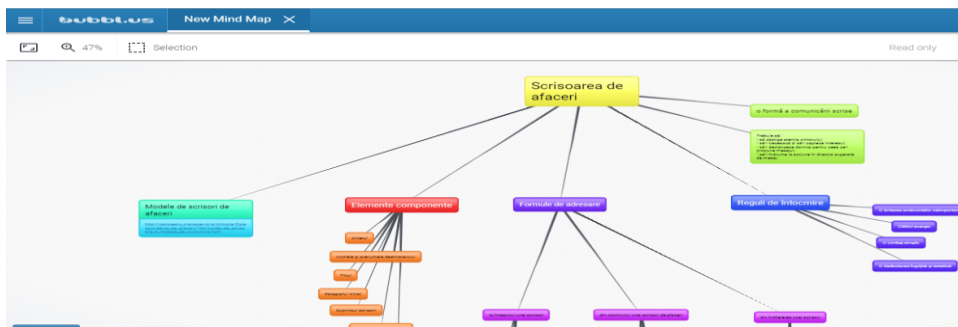
Figure 5. *https://bubbl.us - Business Letter* [20]

f) Edu.glogster.com - is an interactive online site that allows users to create and share posters (glogs) with others. Placed posters can be simple, including text and images, or advanced, including multi-media files and social network links. Using edu.glogster, students created a poster containing the information they learned about Marketing (Figure 6).

Figure 6. *http://edu.glogster.com – Marketing* [17]

g) Padlet.com - Is a tool that gives users the possibility to create documents collaboratively, it works like a wall on wich anybody can post anything (images, movies, documents, texts), anywhere, from any device (computer, tablet, phone). We used this tool in a knowledge-building lesson, when pupils had to complete a padlet document started by the teacher, about nonverbal communication (Figure 7).
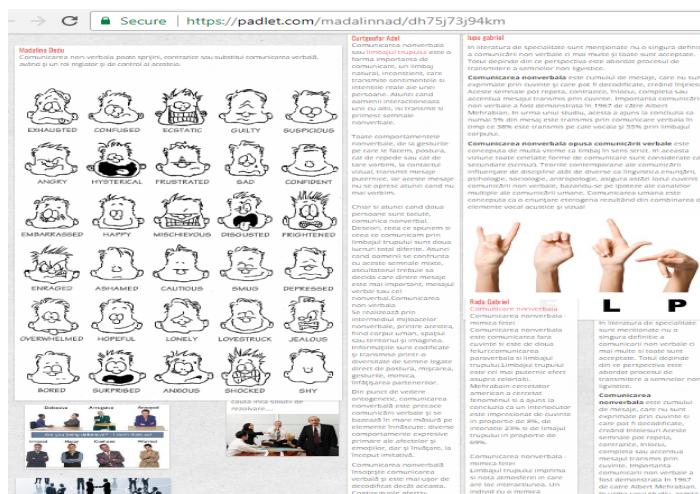

Figure 7. *https://padlet.com - Nonverbal communication* [21]

h) Powtoon.com - is a Web-based animation software that allows students and teachers to quickly and easily create animated presentations by manipulating pre-created objects, imported images, music and voice created by users. We used this tool to create engaging animated presentations of different contents for pupils (Figure 8).

Figure 8. *www.powtoon.com - Direct research methods* [23]

i) Google Drive - is the best-known online file storage service. It offers free 15GB of storage space that can be used to store in cloud and access from anywhere the various text files, images, movies, presentations, etc. In addition, Google provides access to online applications used to create, edit and distribute documents, spreadsheets, presentations, drawings, questionnaires, etc. through a secure network system.
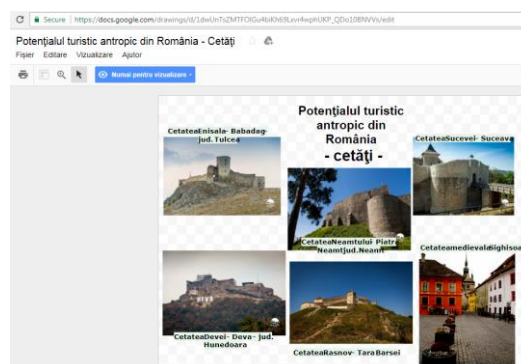

Figure 9. *Google drawings - Anthropic Tourism Potential in Romania* [16]

Coordinating teachers have created Google accounts for the classes in the experimental sample to use the Google Drive applications in their educational activities. With the help of these, the students made presentations [15] and posters (Figure 9) with the acquired and discovered information, they completed evaluation tests and they created sites (Figure 10).
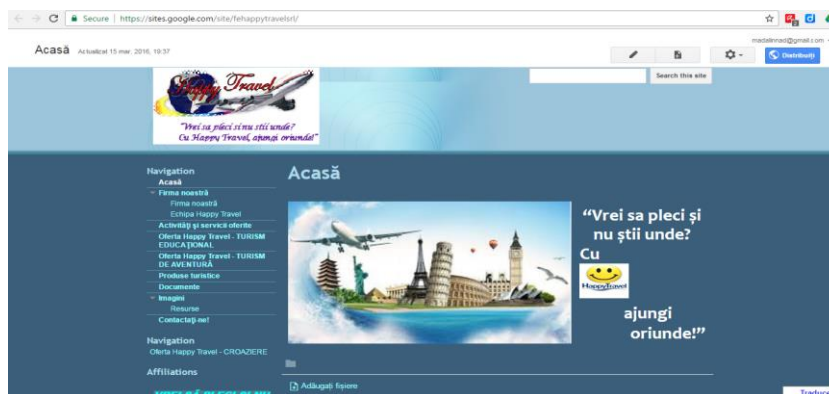
Figure 10. *Google sites – Travel agency* [24]

The *post-experimental stage* consisted of measuring the dependent variable in the two samples of subjects, respectively experimental and control, using similar tests, comparing the initial data with the final data and establishing the relevance of the differences obtained, which leads to confirmation or refutation of the research hypothesis.

To measure the dependent variable, teachers applied tests to assess the knowledge acquired by students in the experimental and control classes following each learning unit included in the content sample. These tests included items of different types and were formulated according to the specific competencies and derived competences of each unit of learning, pursuing the degree of their formation and development at the students of the two samples.

The *retest stage* has determined, over time, the durability of the effects produced by the experiment. At this stage, identical evaluation tests were applied to those in the post-test phase, the results obtained by the students being similar to those of the previous stage.

7. Interpretation of results

The results obtained during the research were interpreted by performing several qualitative and quantitative, intergroup and intragroup comparative analyzes.

The *intergroup analysis* compared the results of the experimental and control samples that were included in the research, at each stage of the research (pretest and posttest).

At the pretest stage we used the t-Test statistical tool to test the hypothesis that there is no difference between the averages of the two samples.

Table 1. *Intergroup analysis – pretest*

t-Test: Two-Sample Assuming Unequal Variances		
	experimental (A)	control (B)
Mean	6.878888889	6.826666667
Variance	0.163386111	0.119325
Observations	9	9
Hypothesized Mea	0	
df	16	
t Stat	0.294649131	
P(T<=t) one-tail	0.386025287	
t Critical one-tail	1.745883669	
P(T<=t) two-tail	0.772050574	
t Critical two-tail	2.119905285	

From Table 1 we noticed that:

- t Stat < t Critical one-tail (0.29<1.75), we admit the null hypothesis, respectively H_0: **average1= average2**;

- t Stat < t Critical two-tail (0.29<2.11), we admit the null hypothesis, respectively H_0: **average1= average2**;

At the post-test stage we used the t-Test tool to test the hypothesis of averages' equality.

Table 2. *Intergroup analysis – posttest*

t-Test: Two-Sample Assuming Unequal Variances		
	experimental (A)	control (B)
Mean	8.332727273	7.331818182
Variance	0.064681818	0.061036364
Observations	11	11
Hypothesized I	0	
df	20	
t Stat	9.362502155	
P(T<=t) one-tai	4.73253E-09	
t Critical one-t	1.724718218	
P(T<=t) two-tai	9.46505E-09	
t Critical two-t	2.085963441	

From Table 2 we noticed that:

- t Stat > t Critical one-tail (9.36>1.72), the null hypothesis is rejected in favor of the alternative hypothesis, respectively H_1: **average1> average2**;

- t Stat > t Critical two-tail (9.36>2.08), the null hypothesis is rejected in favor of the alternative hypothesis, respectively H_1: **average1≠ average2**

The use of this tool demonstrates that the average of the results obtained by the pupils in the experimental sample (A) at posttesting is higher than the average of the results

obtained by the pupils in the control sample (B), i.e. the level of competence's development achieved by the pupils in the experimental sample using the ICT methods is higher than that of pupils in the control sample using classical didactic methods.

Through the *intragroup analysis*, we made longitudinal comparisons, observing the performance evolution of students in the research classes compared to the pretest averages, to highlight the role of ICT methods and techniques in achieving better results.

Table 3. *Pretest-posttest intragroup analysis*

	Experimental sample (A)	Control sample (B)
Pretest average	6.88	6.83
Posttest average	8.33	7.33

Based on the data from Table 3, we plotted the graph in Figure 11, observing that the averages of the results of the two analyzed samples had an ascending evolution between the two moments, pretest - posttest, the results of the experimental sample having a faster evolution compared to the control sample.
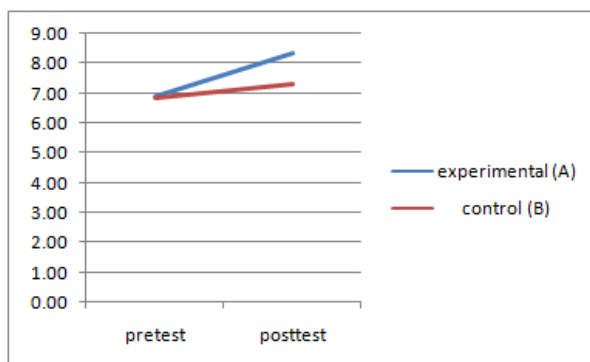
Figure 11. *Pretest-posttest intragroup analysis*

The intragroup analysis shows that the results obtained in posttesting by the students involved in the research are better than those obtained from the pretest, indicating an improvement in the level of development of students' competences. At the same time, the comparative analysis indicates that the results obtained after the post-test by the students of the experimental sample were better than those obtained by the students of the control sample. That is to say, the former have acquired the new knowledge better by using ICT methods in teaching / learning activities than those in the second sample who have used traditional and modern teaching methods in the educational process.

8. Conclusions

Analyzing the results of the pedagogical experiment, we can see a better evolution of the experimental sample compared to the control sample, the school performance obtained by it beeing due to the use of ICT methods and tools in teaching and learning information within the tourism modules.

Achieving better learning outcomes can be determined by various factors, such as: the learning environment, the teaching style used by the teacher, the initial level of the learners' knowledge, the age and level of study, the methods and the means used in teaching and learning, etc. In the course of this experiment, the only factor that was different for the two samples and whose influence was followed was the methods and means of teaching used during teaching-learning activities. The experiment unfolded between equivalent student classes, grouped two by two, from the same level of study, of the same age, from the same high schools, working in the same laboratories, coordinated by the same teachers.

Regarding the didactic methods and means used, in the educational activities carried out with the classes in the control sample were used traditional and modern methods of teaching - learning, and in the activities conducted with the classes in the experimental sample, ICT methods and tools were used, following the difference between the results obtained by the students from the two samples in the posttesting and retesting stages of the research.

The statistical results obtained by processing the data collected in the study confirm the research hypothesis. Using the t-Test tool in the Microsoft Excel program to test the hypothesis of averages' equality, we demonstrated that the averages of the results obtained by the pupils in the experimental sample to the posttest and retest was higher than the averages of the results obtained by the pupils in the control sample.

In these circumstances, we consider that the purpose of the research has been largely achieved, demonstrating that the use of Information and Communication Technology as a teaching, learning and evaluation didactic method is effective for improving the instructional and educational process within the tourism high schools.

Transmitting new information with technology involves combining texts with images, sounds, colors, films to create attractive and motivating materials for learners actively involved in the learning process. At the same time, learning with ICT methods means the use of different computer programs and applications by students in order to better understand the information received and to create

materials useful for learning. Developing skills to use ICT tools is also beneficial to individuals after completing their studies, both personally and professionally.

References

[1] Blurton, C. (1999). New Directions of ICT - Use in Education, *UNESCO's World Communication and Information Report*, Retrieved 2015, from http://www.unesco.org/education/lwf/dl/edict.pdf

[2] Commission of the European Communities. (2001). *Information and Communication Technologies in Development The role of ICTs in EC development policy.* Retrieved from https://ec.europa.eu/europeaid/sites/devco/files/communication-ict-development-policy-com2001770-20011214_en.pdf

[3] Crane, B. E. (2012). *Using Web 2.0 and Social Networking Tools in the K-12 Classroom, ALA Publishing.* Chicago: https://books.google.ro/books?id=zAqSAwAAQBAJ&printsec=frontcover&hl=ro&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false.

[4] Guvernul României, Ministerul Comunicaţiilor şi Societăţii Informaţionale. (2012). *Utilizarea TIC pentru activităţi educaţionale – ghid pentru profesori, Economia bazată pe cunoaştere.* http://www.marinpredapitesti.ro/wp-content/uploads/2013/11/ghid-pentru-profesori.pdf.

[5] Hargadon, S. (2008). *Web 2.0 Is the Future of Education.* Retrieved 2015, from http://www.stevehargadon.com/2008/03/web-20-is-future-of-education.html

[6] Institutul de Ştiinţe ale Educaţiei. (2011). *Utilizarea tehnologiei informaţiei şi comunicării în activitatea de consiliere.* Retrieved 2015, from http://www.ise.ro/wp-content/uploads/2011/08/Utilizarea-TIC-in-consiliere_2011.pdf

[7] Leavitt, H. J., & Whisler, T. L. (1958). Management in the 1980's. *Harvard Business Review* , https://hbr.org/1958/11/management-in-the-1980s.

[8] Müller, R., & Schumann, W. (2011). *Ce este Web 2.0?* Retrieved 2015, from http://www.dadalos.org/web_20_rom/web_20.htm

[9] O'Reilly, T. (2005). *What is Web 2.0.* Retrieved 2015, from http://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html

[10] Popescu, C. N. (2013). *Prezent si perspective ale utilizarii TIC in procesul educational.* Retrieved 2015, from https://ro.scribd.com/document/137537228/Prezent-Si-Perspective-Ale-Utilizarii-TIC-in-Procesul-Educational

[11] Tinio, V. L. (2003). *ICT in Education, UNDP-APDIP.* Retrieved from http://wikieducator.org/images/f/ff/Eprimer-edu_ICT_in_Education.pdf

[12] Vandenbroucke, F. (2007). *Competencies for the knowledge society. ICT in education initiative,* Flemish Minister for Employment, Education and Training. Retrieved 2015, from https://www.scribd.com/document/7382723/Competencies-for-the-Knowledge-Society

[13] ***. (2014). *Integrarea Tehnologiei Informaţiei şi a Comunicaţiilor (TIC) în curriculumul naţional - Discipline Informatice Suport de curs.* Retrieved 2015, from https://programareliceu.files.wordpress.com/2014/07/suport_de_curs_integrare-tic-in-informatica.pdf

[14] chimiainscoala.wordpress.com. (2015). *Aplicatiile web 2.0 – suportul educatiei viitorului.* Retrieved 2015, from https://chimiainscoala.wordpress.com/2015/06/26/aplicatiile-web-2-0-suportul-educatiei-viitorului/

[15] https://docs.google.com/presentation/d/1xjxZ8e8q5QtDDHmsj0aRC7627TrMG0DM85oUC0DKdZw/present?ueb=true&slide=id.p46

[16] https://docs.google.com/drawings/d/1dwUnTsZMTFOlGu4biKh69Lxvr4wphUKP_QDo10BNVVs/edit?usp=sharing

[17] http://edu.glogster.com/glog/marketing/254w0n4c34w

[18] http://www.classtools.net/qwikslides/63_jaaLHE

[19] https://creately.com/diagram/ibnocgo1/n5LEASiufiht8oujgBvgqDc8cE%3D

[20] https://bubbl.us/MjQzNTkyMi80OTIxNDc0LzcyYzY4NjYxNGRkZDEwZDMxODlkYTkyZDU
3NWYwZTdi-X

[21] https://padlet.com/madalinnad/dh75j73j94km

[22] http://popplet.com/app/#/2575732

[23] https://www.powtoon.com/c/ci5v3WPHNms/1/m

[24] https://sites.google.com/site/fehappytravelsrl/

[25] www.easyclass.com

Authors

Mocanu (Dedu) Elena Mădălina, PhD Student, Doctoral School of Management, Bucharest University of Economic Studies, Bucharest, Romania, e-mail:madalinnad@yahoo.com

Deaconu Alecxandrina, Professor PhD., Management Faculty, Bucharest University of Economic Studies, Bucharest, Romania, e-mail: alecxandrinadeaconu@gmail.com