ROMÂNIA
MINISTRY OF NATIONAL EDUCATION
"BABEȘ-BOLYAI" UNIVERSITY, CLUJ-NAPOCA
FACULTY OF PSYCHOLOGY AND EDUCATIONAL SCIENCES
"EDUCATION, REFLECTION, DEVELOPMENT" DOCTORAL SCHOOL

EXTENDED ABSTRACT OF THE DOCTORAL THESIS

The Optimization of Primary Evaluation of Digital Resources in the Internet Domain. Conceiving and Using an Educational Portal

Ph.D. student,
Ciprian Baciu

Thesis advisor,
Prof. Vasile Chiș, Ph.D.

Cluj-Napoca
2018

Motto:

Being informed does not mean receiving an entity that we call information, but to situate in a certain manner in the relation with the world, relating critically to the world; "information is always an interpretation" of a world sequence, an emergence of the cognitive activities (G. Fourez, 1988, page 30).

Key concepts: digital resources, digitalization, digital society, portal, platform

Table of contents

Part I

THEORETICAL FOUNDATION OF USING EDUCATIONAL PORTALS

Chapter I

CHALLENGES OF CONTEMPORARY EDUCATION IN THE CONTEXT OF DIGITALIZATION

Chapter II

PSYCHOPEDAGOGICAL PROBLEMATICS OF EDUCATIONAL RESOURCES: DEFINITION, HISTORY, EVOLUTION, FEATURES IN THE DIGITAL SOCIETY

Chapter V

PRESENTATION AND ANALYSIS OF THE OBTAINED RESULTS

Chapter VI

CONCLUSIONS

Introduction

The doctoral thesis "Optimization of Primary Evaluation of Digital Resources in the Internet Domain. Conceiving and Using an Educational Portal" are based on a two-component research: a theoretical-fundamental one and a practical-applicative one.

The paper is structured in two parts, six chapters, a bibliographic list. The three first chapters are theoretical, titled "Theoretical fundamentals of using educational portals", where conceptual delimitations are provided for the key concepts of the thesis: digital resources, digitization, digital society, portal, platform. We also intend to give meaning to these concepts in the context of today's digital society.

The general premise of the doctoral thesis is that New Information and Communication Technologies (NICT) have created conditions for the emergence of the *knowledge society* – a society based on knowledge and generalization of knowledge communication. Hence the role of the educational society, the learning society and the innovation society. In its turn, the knowledge society is possible given the existence of the *informational/computerized society*, from which it cannot be separated and on the canvas to which it appears. It can be considered that a society is informational only if the number of people, structures and institutions that are currently using information technology exceeds a critical value, that is only if the access to digital resources becomes a mass phenomenon. A well-developed information society is a foundation on which *digital society* develops, where citizens become digital citizens, governance becomes e-government, services turn into e-services, etc.

The new dimensions and tendencies emerging in the temporary educational systems place the 3rd millennium's pedagogy in the situation of seeking optimal models of integration of theoretical training, knowledge and practical training, for competencies (Chiș, 2014). Theoreticians and practitioners in the field of education have more and more often to call for new communication and information technologies to find the optimal model in solving the problems or requirements of the current educational systems. The revolution that takes place in the field of science and technology constantly provokes the emergence of new concepts, and with them, the emergence of new terms. If several years ago, such as eLearning, New Media, digital education, audiovisual education, nano-sciences, nanotechnologies, etc., met only in specialized works, today these terms have reached the common language of contemporary society.

In a society where the distance between the sci-fi world and that of science and reality is shortening at an alert pace (due to the multitude of inventions and innovations, the

exponential growth of the amount of generated information), it is imperative that modern man adapt to the new conditions, as well as future societal conditions. This adaptation implies the emergence of new forms of communication, media (communication, economic, business, governance, financial, virtual, practically related to all aspects of human life) and communication tools, in order to reach the present and emerging goals. If several decades ago, such as cyberspace, virtual reality, augmented reality, artificial intelligence met mainly in science fiction, we can see that these terms have become part of academic literature or have found applications in the economic sphere. We also witness the emergence of new occupations (occupations that did not exist just 5-10 years ago), such as Uber driver, big data analyst, virtual reality and augmented reality developer, youtube content creator etc.

All these challenges require a response from the educational systems, and educators must be ready to respond, as education is the domain that is being built and restored by a permanent adaptation to social change, school must be the field that responds promptly to change produced in society, must be prepared to provide solutions to the problems faced by contemporary society.

Chapter I
CHALLENGES OF CONTEMPORARY EDUCATION IN THE CONTEXT OF DIGITALIZATION

I.1. Contemporary education – features, orientations, tendencies, challenges

Knowledge represents the essential of all contemporary society's approaches. The educational system is permanently in the face of changing demands coming from both the outside environment and the interior. In order to be able to fulfill in optimal conditions functions like any open system, and the educational system must be flexible and adaptable to the new and to change.

For adaptation and innovation, educational systems aim at strategic goals, related to the phenomenon of globalization of the access to information, new knowledge, the dissemination of knowledge values, in the technological plan, based on the acquisition of the scientific and technical acquisitions coming from the field of communication sciences, a new strategic direction has been developed - the computerization of education at all its levels. The computerization of education ensures the progress of the informational society and is the foundation upon which the knowledge society is built, by cumulative processes of globalization and the universalization of knowledge (see subchapter II.1.). The computerization of education has a double dimension: a) social, reflected in the construction

of modern, postmodern and meta-modern education systems; In addition, computerization of education is not only the building of physical communication networks between equipment, but it also enables the formation of online learning communities, social learning networks, social networks; b) psychological, involved in the valorisation of the new technologies in the design and achievement of the educational process, regarding the adaptation of the educational agents to the new peculiarities of the learning situations and the new educational requirements (http://www.tribunainvatamantului.ro/informatizarea-educatiei/).

The development of such information systems is a consequence of the information explosion as a result of the development and emergence of new equipment, sensors, devices, for which it is necessary to have channels for the distribution of information from the receiver to the source, without being blocked as a consequence of the limitations pertaining to the physical features of the communication channel. We cannot talk about the phenomenon of globalization without having the necessary communication channels and sufficiently developed for the transfer between two points. In this context, we can talk about global learning as the premise of the competence building process for the realities of a multicultural, diverse and interdependent world, where information on the effects of political, social, economic, educational, technologies.

I.1.1. Pragmatic aspects of contemporary education

Society is in a constant development, we live in a period when technology is no longer a pomposity but a necessity. Educational systems are required to integrate new information and communication technologies in school in order to keep up with today's contemporary society development needs – with the knowledge society. This is also reflected in the 2005 UNESCO Report, stating that "The new information and communication technologies have created new conditions for the emergence of knowledge societies… This is the true issue for societies, which are going to need to be both knowledge societies and innovation societies – and must, therefore, become learning societies." (UNESCO, 2005, pp. 27-59)

We cannot talk about a modern learning society without talking about school as a smart institution, a component of smart cities, in which digital citizens are formed, integrated into today's and the future's society. Intelligent school is an institution capable of constantly adapting to the contexts of society and providing answers to the problems faced by different fields and societal environments. In this type of school, continuous and generative learning is promoted in favorable learning environments, including virtual learning, in accordance with strategies developed at the national or international level, making learning possible.

From the informational and formative point of view, this means that each class/group of pupils function as learning and research communities, according to the model of the laboratories, of the artistic workshops, to foster the creation of verbal, intellectual, social.

On the other hand, challenges, psycho-social and cultural constraints trigger and produce constant transformations, individual, social, professional, anthropological updates. The scope of our activities has a different psychological, temporal, and spatial dimension, and transcends national boundaries, becoming planetary.

The whole world tends to become an informational society, which generates the need for children to be prepared for their beneficial interaction with the world they live in, from the earliest ages, now with digital devices. The current age is characterized by speed, rapid exchange of information and data, the use of digital devices (smartphones, tablets, laptops, goggles for reality AR and VR etc.), artificial intelligence, and in the education of the means of education last generation.

I.1.2. Audiovisual pedagogy – a branch of modern pedagogy

The new dimensions and tendencies emerging in contemporary educational systems place the 3rd millennium's pedagogy in the situation of seeking optimal models of integration of theoretical training, knowledge and practical training, for competences (Chiş, 2014).

In the face of such scientific and technological revolutions, pedagogy cannot remain indifferent, as evidenced by Vasile Chiş, in the paper "Pedagogia contemporană - pedagogia pentru competențe": "competence pedagogy challenges the educational city to a debate on the future, but also on sustainable applications. (...) Of course, technology and pedagogy are in a circular case. They develop through reciprocity and complementarity, even though there are gaps in the generalized applications of new technologies in schools "(Chiș, 2005, pp. 9-13).

Thus, today we are talking about an audiovisual pedagogy, pedagogy that refers to the branch of pedagogy that studies the theoretical and practical problems of the training and training made using the modern means of information and communication (Bocoș, 2013).

Classic multimedia technologies such as radio and television are not sufficiently suited to the requirements of organizing an eLearning program for distance education in line with current information society and knowledge requirements. This has led to the development of new information and communication technologies based on the use of the Internet as a point of support. There are currently three main categories for audiovisual communication in digital networks:

Figure No. 2.I. *Types of audio-video broadcasting technologies*

I.2.1. Technologization, computerization, digitalization in education

The phenomenon of globalization of information and the extension of access to information has led to the formulation of a strategic goal of educational systems, namely the computerization of education. It involves the elaboration, processing, and dissemination of the values of knowledge, not only technologically but also conceptually, based on the assumption of existential models asserted universally, by differentiation, but also by complementarity.

In education, computerization involves the provision of computer resources (hardware, software, Internet) for organizing and carrying out didactic and administrative activity in the units of the national education system, according to the current cultural model of the computerized society, for improving the working methodology, increasing the response capacity and improving the education process.

I.2.1.1. Digitalization, ICT and NICT: Terminological demarcations

Digitization represents a specialized digital information transformation operation in digital format with the aid of digital equipment. In education, it presents a number of relevant applications, which are constantly developing. Among these, we mention curricular digitization/ curriculum digitization and digitization of curricular content, which underlies the development of digital textbooks, educational software, educational platforms etc.

Information and Communication Technology (ICT) is the technology required for information processing, not necessarily with the use of computers/microprocessors. ICT includes all known techniques and procedures for receiving, processing, transmitting information, including how to organize, execute, and supervise communications processes or activities.

New Information and Communication Technologies (NICT) is the set of modern technologies and digital devices (computer, digital tablet, video projector, mobile phone, play

station, virtual and augmented reality headphones, educational software etc.) that can be used to modernize activities informative and communicative. In education, NICT facilitates learning, providing powerful tools for structuring, accessing, and presenting information dynamically, as well as opportunities to motivate learners to learn. The use of NICT in instruction involves the exercise of their active, critical and creative spirit in relation with the content of the training and the multimedia resources used, active and innovative and creative information and learning, as well as the establishment of interactions and social relationships. Learning activities focused on NICT are more accessible and attractive to educators, expanding the scope of learning experiences.

I.2.1.2. Computerization and digitalization of education - Case study: an Educational system in Australia

In this subchapter, we aim to present the curriculum model of the "Digital Technology" curriculum in Australia, thanks to the country's pioneering in the field of distance learning, implemented with the help of ICT and NICT. We chose this document to analyze curricular trends in the use of digital technology in education, namely in setting up the "Digital Technology" school discipline, precisely because of its novelty, as well as Australian experience/expertise in the use of new technologies in teaching and learning one of the first countries to have developed a distance education system based on new information and communication technologies since the last decade of the last century).

This document can be a valuable resource for the analysis and improvement of the Romanian curriculum, but also of other European states, in the field of information and communication technology.

I.2.2.1. Traditional communication

Communication is an evolution process in close relation with the development of the human species, it is an essential process for the maintenance of interpersonal relationships, the exchange of information, ideas, feelings, emotions, and the links that underlie the social organization.

Ever since antiquity, Aristotle focused on the rhetorical dimension of communication (Stan, C., p.47, 2010), the primordial importance of the transmitter's persuasion. This explains the emphasis on the argumentation of the message, on its para-verbal dimension and on the preoccupation to transmit emotional states and emotions.

Communication science and information theory provide us several models of communication. One of these models is presented in Figure no. 3.I.

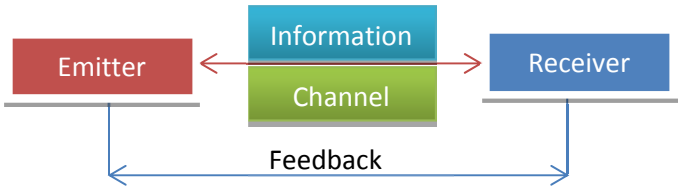


Figure No. 3.I. *Structure of human communication*

As it can be seen, each component works independently, finds itself in different spheres, is a scheme specific to classical communication.

I.2.2.2. Postmodern communication

Communication as a process, in the postmodern vision, supposes the physical existence of at least two people: one with the role of the emitter (E) and the other one with the role of Receiver (R), transmitting each other as a message (M) using a communication channel (C).

I.2.2.3. Metamodern communication

The term meta-modernism, although introduced in 1975 by Mas'ud Zavarzadeh, which considers it an emergence from the aesthetic area, was not sufficiently founded. Recently, in 2010, the concept of metamodernism was (re)introduced by Timotheus Vermeulen and Robin van den Akker (2010) with references to the same field.

Meta-modernism is the stage in giving up the skepticism specific to postmodern thinking, proposing "reconciliation", reconciling modern with postmodern, but also postmodern with itself, is the stage in which criticism and troublemaking is not the key but constructive effort to find solutions to societal problems. Metamodernism promotes an anticipative and proactive thinking: "how will it be in the future if", "what can we do to..." a positive thinking, a meditative thinking, a reflexive, logical, active and proactive thinking.

We consider that in the meta-modern society, a society based mainly on the use of new information and communication technologies, the Internet (digital communication), some changes have occurred in the structure of communication due to the deep interpenetration

between the information emitter, channel and feedback, many times they can be in the same sphere (asynchronous unidirectional technologies).

I.2.2.4. Digital communication. Particularities of the educational area

According to the praxiological dictionary of pedagogy, interpersonal communication is: "the ensemble of the interpersonal processes in which interpersonal exchanges of messages, meanings, decisions, value judgments, affective states, and influences are realized with the help of components/elements of their own communication repertoires, at least two people. In interpersonal communication, the interlocutors can also hold the transmitter's hypostasis and receptor hypostasis "(Bocoș, coord. 2016).

As an assembly of interpersonal processes, communication involves the realization of reciprocal interpersonal exchanges of messages, meanings, decisions, value judgments, affective states, and influences, with the help of the components/elements of their own communication repertoires, between at least two persons. In interpersonal communication, the interlocutors can also hold the transmitter's hypostasis and receptor hypostasis. In school organizations, interpersonal communication can take the following forms: organizational communication (school), managerial communication, educational communication, and didactic communication.

Figure No. 4.I. *Graphic model outlining the relations between various types of communication*

Digital educational communication requires comprehension and correct operation with appropriate terms relating to the circulation of information. In the following, we will refrain from characterizing two of the basic concepts, namely the digital media and New Media.

Digital media refers to digitized content in an electronic format that can be transmitted over the Internet or computers network. It can include text files as well as audio, video, and graphics.

Starting from the definitions formulated by Robert Logan, Bailey Socha and Barbara Eber-Schmid, we can now say that ***New Media is the set of interconnected digital equipment in the form of a "cloud of technology" (Socha & Eber-Schmid, 2018), through which image and sound can be generated, stored, processed, copied, transformed, processed, articulated and transferred in large volumes at very high speeds, most often based on algorithms and artificial intelligence - in the sphere of an informational cloud. Information Cloud is the aggregate of information generated, saved and managed through cloud computing services***.

From the point of view of the analysis of communication science from the perspective of metamodernism, we propose the following graphic representation of the general scheme of communication in cloud computing, a specific scheme based on the information society based on the Internet.

Cloud computing represents a package of online services such as data storage on servers, computing services, and applications, access to information that is offered to consumers via the Internet, without having to know the configuration or physical location of the systems that provide such services. Currently, the most important cloud computing providers are Microsoft, Google, Amazon, Alibaba, IBM, Salesforce, Skytap, HP.

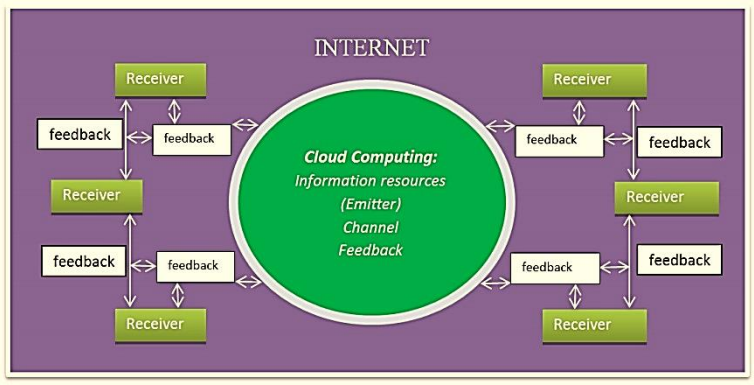


Figure No. 5.I. *Communication specific to Internet-based information society*

According to the picture above, it can be noticed that from this perspective, the Internet becomes both the emitter (information resource) and the channel for the transmission of information. At the same time, in the Internet and NICT (New Information and Communication Technologies/Communications) sphere, feedback can also be obtained by means of programs analyzing and evaluating acquisitions accumulated by the receiver, all of which are carried out in the cloud. We can also see the phenomenon of globalization of access

to information resources and feedback, all processes taking place through the same communication channel - the Internet.

Digital communication and cloud communication do not necessarily imply the physical existence of two people. In this type of communication, the role of the second person (receiver or emitter) can be taken over by a virtual person, a software based on artificial intelligence such as Siri, Google Assistant, Bixby, Amazon-Alexa, Cortana, Dragon Mobile Assistant, Jarvis etc.

I.2.3.1. From industrial revolutions to a digital society

The Industrial Revolution, which began with the "water domestication/taming", has led to a series of deep transformations in the evolution of human society (https://dc.cod.edu/cgi/viewcontent.cgi?article=1458&context=essai).

The pre-industrial stage was based on the use of human, animal, wind, or liquid state water rough force to move various tools or installations specific to this pre-industrial - agricultural stage - wind/water mill, rock, etc.). At the beginning of humanity, it was necessary for man to "domesticate" the fire for the making of tools, superior to those of stone, then to pass many thousands of years until the day that he understood that the fire energy could use it for "transformation and taming" another vital element in our development: water, resulting in steam. (Maguire, 2013).

Following the discovery of new energy sources, the second industrial revolution took place in the late 19th century, around 1870. Electricity and fuels produced by crude oil have led to the invention of new engines - the internal combustion engine and the electric motor - that replace the steam engine developed by James Watt.

All of these acquisitions allowed the development of new industrial branches - the electrotechnical, chemical, cinematographic, automobile, and so on.

In our opinion, the Third Industrial Revolution debuts with the invention of the transistor in 1947 and continues to this day - overlapping partially over the fourth industrial revolution. The year 1947 can be considered as the year of the third industrial revolution's debut because the invention of the transistor subsequently led to the emergence of integrated circuits, microprocessors - computers, mobile phones, tablets, new audio processing and transmission devices, video, and the Internet.

In 2016, the engineer, professor, and economist Klaus Schwab, founder and executive president of the World Economic Forum at the Davos Forum, as well as in the book The Fourth Industrial Revolution, introduces and explains a new concept: The Fourth Industrial

Revolution (4IR). Even though some of the 4IR specific technologies were invented before the introduction of this new concept, 2016 can be considered as the birth year of the fourth industrial revolution.

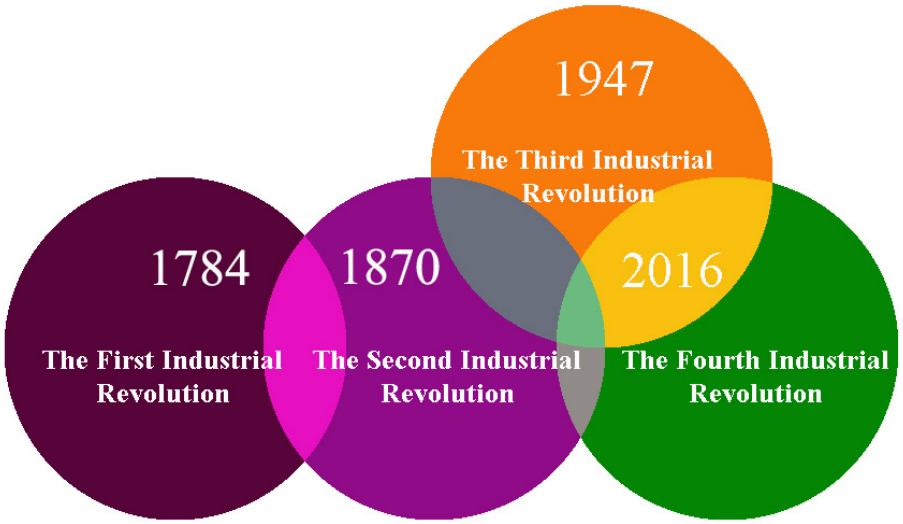


Figure No. 7.I. *Stages of Industrial Revolution*

The Fourth Industrial Revolution (4IR) is characterized by a fusion of technologies that blur the physical, digital and biological boundaries - human symbiosis with technology. This stage is marked by emerging technological advances in a number of areas including robotics, artificial intelligence, the blockchain, nanotechnology, quantum computing, biotechnology, Internet of Things (IoT), Internet of Everything (IoE), 3D printing and autonomous vehicles.

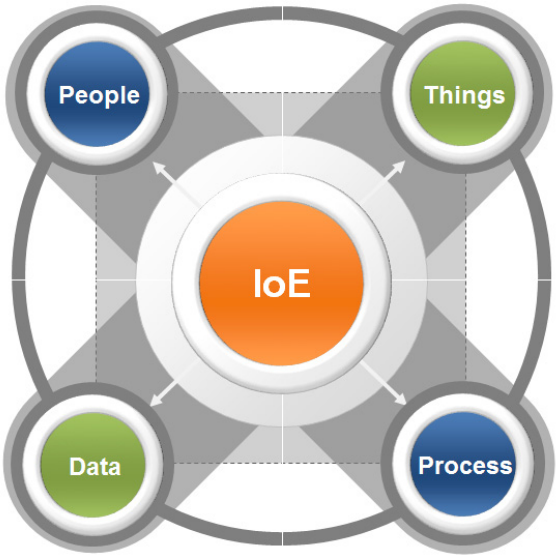


Figure No. 10.I. *The four pillars of "Internet of Everything"*

Pillar	Significance
People	Connects people in most relevant and valuable ways
Data	Articulation of data into information and knowledge for better decision-making
Processes	Providing correct information to the right person (or machine) at the right time
Things	Interconnected objects and physical devices with the aid of the Internet for intelligent decision-making; often called the Internet of Things (IoT)

The Internet of Things (IoT) is an emerging technology and can be understood as the network of objects that can be interconnected with the help of the Internet so that they can generate, store, process and exchange data for the benefit of society. As a result of the Fourth Industrial Revolution, some of the following changes are predicted:

- genetic modification/manipulation;
- personalized medicine;
- personalized learning;
- increasing human brain abilities - memory, processing, analysis - by using Hi-Tech augmentation technologies;
- how to use, store and produce energy;
- next-gen electronics;
- integration of virtual and physical worlds into so-called cyber-physical systems; developing systems (of the worlds) based on virtual reality and augmented reality;
- Internet of Everything (IoE) and the Internet of Things (IoT);
- driverless cars;
- supercomputers (quantum computing);
- industrial automation;
- intelligent robots;
- machine learning, Deep learning, and Natural Language Processing (Computational Language Processing);
- advanced artificial intelligence.

I.2.3.2. Digital Transformation and integration in education. Cyberschool, OCW, and MOOC

Since the adoption of information and communication technologies is a vital step towards digital transformation and integration, Information and Communication Technology needs to be integrated into the learning process, and its computerization is a necessity for the development of digital societies. There is a need to provide access to information society values as well as the need to digitize the curriculum for the digital age in order to integrate the

pupil into the information society that characterizes the present and especially the future of mankind.

The curriculum needs to be modified in order to introduce NICT components to achieve strategic goals such as critical thinking, entrepreneurial thinking, problem-solving, understanding of complex phenomena based on simulation, prospects of the evolution of events, teamwork and research. Students should learn from the youngest age to use information and communication technologies to meet the demands and challenges of the contemporary world (https://cyber.harvard.edu/readinessguide/Readiness-translation%20Romanian.doc). Thus, the phrase digital education emerged as a dimension of education that highlights the need for a modern man to report and develop his personality in digital era technologies. Thus, digital education primarily aims at acquiring knowledge, building the skills and attitudes needed to use digital devices and on online communication, and developing digital intelligence and creativity.

Digital education is realized, to a great extent, in school, and this is subject to paradigmatic transformations due to technological progress. These transformations have led to the emergence of new educational concepts, practices, and policies, to the emergence of new learning communities facilitated by cyberspace. It is a specific, virtually unlimited space in which reality and its entities are technologically articulated with NICT. Cyberspace allows the expansion of the human dimension and the virtual dimension of human activities beyond the realm of material reality; thus, cyberspace offers relevant and specific opportunities for educational, self-information and (self) training.

The central concept is the cyberschool, which we intend to define and schematize further in Figure 15.I. As it can be seen in the picture, there are similarities between the traditional school concept and the virtual school concept (cyberschool).

Both are educational institutions where educational processes take place. The difference between them is that in cyberschool all educational activities are done through the Internet in cyberspace (face-to-face activities are poorly represented or do not exist). This changes the significance of the teaching concept, so we can talk about e-teaching as a teaching process in which the educator's actions are done with NICT, by capitalizing texts, pictures, animations, video etc., or on a support static or dynamic.

Learners can be organized individually or in groups (e-groups) and be involved in specific teaching, learning, evaluation, cyberspace activities in the e-learning process. They cross together certain curricular content, interacting with the teacher and colleagues from a distance, in the context of online learning lessons/activities, in the virtual learning environment, in cyberspace.

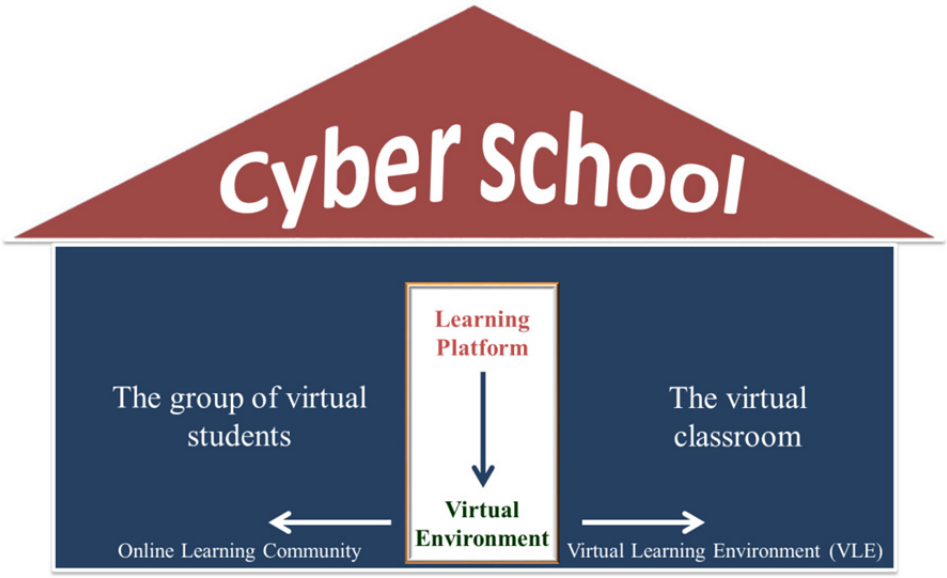


Figure No. 15.I. *Graphic model for the cyberschool concept (School 2.0)*

The Virtual Learning Environment (VLE) is an information space designed for learning.

The group of virtual students is a virtual learning community, composed of a number of students of about the same age and level of education who go together with some curricular content interacting with the teacher in the context of online educational lessons/activities in cyberspace.

The virtual classroom is the virtual space that favors the establishment of interactions in the virtual environment between educators and teachers. Mainly through the Internet, learners, study, access various curricular content, share ideas, files, solve work tasks, themes, problems (seeing video lessons, online courses, video teaching materials or electronic format etc .), at your own pace, in the online environment.

Lately, universities have opened their doors in the online area to broaden access to education for anyone regardless of geography, age, gender, race, ethnicity, etc. Thus, the MOOC (Massive Open Online Course) appeared in English as: “A free, online content delivery solution for learning content that allows for an unlimited number of participants with different goals, interests, knowledge, and skills, to facilitate the creation of a lifelong learning community.

Chapter II

PSYCHOPEDAGOGICAL PROBLEMATICS OF EDUCATIONAL RESOURCES: DEFINITION, HISTORY, EVOLUTION, FEATURES IN THE DIGITAL SOCIETY

II.1. Information society, knowledge society, digital society – evolution concepts

Beginning with the end of the 19th century and continuing in the 20th and 21st centuries, culture, but also science and economics have undergone deep, even radical transformations that have influenced their specific models and languages. From the desire to ensure the rigorous-scientific character of the approaches, in modern societies, the tendency to increasingly focus the studies and research towards the logical-mathematical interpretation of processes and phenomena has become almost general.

The mathematical study of the processes and phenomena running on the principle of command and control has led to the emergence of cybernetics, which is based on the mechanism of feedback associated with an object (being, phenomenon, machine) acting on its environment (interior or exterior) to achieve well-defined goals. The development of cybernetics on a theoretical and practical level radically altered the visions, strategies, and methodologies for addressing the fundamental problems in the fields of human activity.

All these accelerated transformations in the field of culture, science, and technology have led to a real explosion in the generation of raw data, how they are transmitted and stored, in generating new information, and in fostering information/computerization.

Information society/computerized society is a society that, as a whole, relies mainly on the generation and consumption of data/information; at the general societal level, information is the main instrumental resource, and basic technologies are information and communication technologies. Thus, the information society, based on developed computer networks, allows fast, quasi-instant access to information for anyone, anytime, anywhere. Therefore, we can state that the information society is the foundation of the knowledge society (which organizes information, generating knowledge resources).

Starting with the nineteenth century of the last century (Iancu, 1997), a new stage of the information society is emerging - the knowledge society. This phrase refers to the fact that society as a whole is founded on knowledge and generalization of knowledge communication. The knowledge society differs from the information society in that it generates knowledge by transforming, processing and articulating information into knowledge resources that are offered to all members of society in order to improve the human condition (Bocoş, 2018).

The information society and the one derived from it - the knowledge society is associated with evolutionary stages in which new forms of communication have emerged (online communication, digital communication, virtual communication, etc.), new strategic options and new action models in various fields of human activity: education, learning, health, business, governance and territorial administration, mutations occurring from different types of social services to e-services (Figure No. 2.II.):

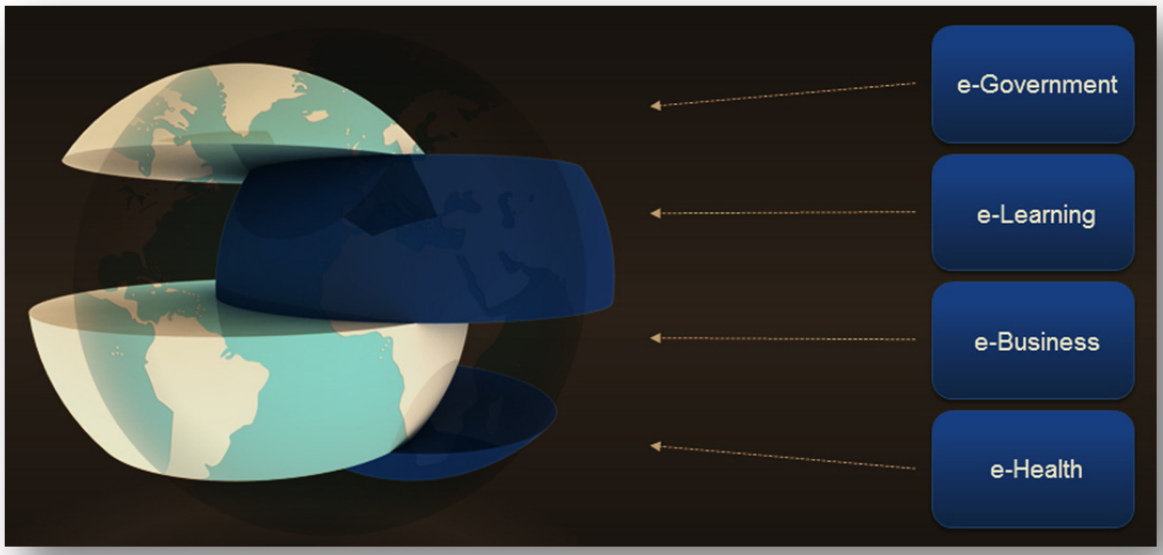


Figure No. 2.II. *Evolution from services to e-services in the information society*

In this society, people who use the Internet regularly and efficiently (Mossberger et al., 2011, apud Isman, 2013 - https://ac.els-cdn.com/S1877042813046788/1-s2.0-S1877042813046788-main.pdf?_tid=78034616-54b5-4b48-8d8c-3708f0a383f5&acdnat=1528279309_fd7d87e686b573b4d3ee836768da7678) are often called digital citizens or digital consumers, a term used to point out that we can talk about a new evolutionary phase of the company - https://en.wikipedia.org/wiki/Information_society. For example, in the field of education, these rapid changes have led to the emergence of new forms of education, educational resources, new sources, and educational resources - digital resources, including new technologies and digital textbooks.

Contemporary, knowledge-based society is characterized by generating a large amount of raw data, information, and knowledge resulting from its processing, mass dissemination of information technologies. In order to emphasize the amplitude of this phenomenon, the phrase informational explosion was introduced, which, figuratively, refers to the rapid, strongly

ascending increase of the quantity, dynamics, and flow of data and information, as well as to the effects of this abundance.

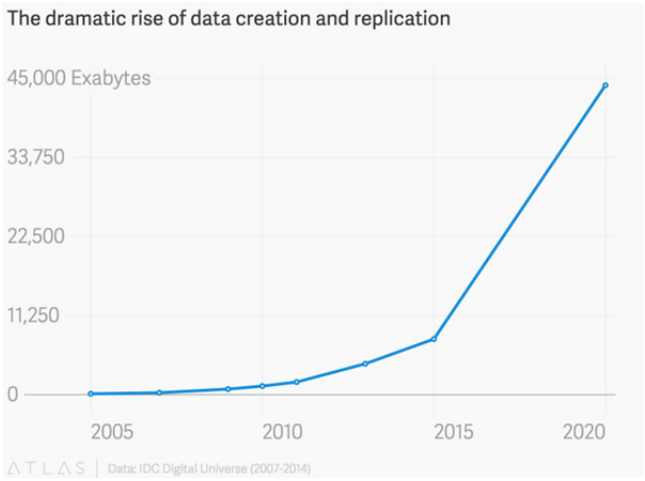


Figure 3.II. *Informational explosion curb*

(source: https://www.theatlas.com/charts/E1Wxox0c)

This information explosion has its origins in the accelerated development of technological advances through the emergence and development of new equipment, devices, and sensors that have led to the generation and storage of vast and complex quantities of data sets (Leung & Zhang, 2016).

Datum/data are a representation of the facts, concepts or instructions that can be processed by a person, machine or computer equipment in the form of information that can be communicated. Gross data can be simple and apparently random. They can be considered useless until they are interpreted and processed to determine their true meaning - the moment they become useful and can receive the name of the information.

These data sets can no longer be managed and interpreted in a relatively short time with traditional methods of analysis (Fan & Bifet, 2012). The difficulty in managing these Big Data using traditional methods (storage, management, and analysis) is mainly due to the large volume of data sets, the variety - the complex format and the diversity of the source, the generation speed, and their volatility (for how long they are stored or available).

Therefore, for the storage, analysis, and interpretation of the attributes of these Big Data sets - components of Big Data, new techniques and analysis models (Bakshi, 2016) had to be developed in order to:

- exploiting or gaining added value, by studying the accuracy of the data to be used;
- ensuring the validity of the data, checking the correctness;
- ensuring the accuracy and reproducibility of data - of their veracity.

In our opinion, all these attributes, specific to the big data, are/may be vulnerable at some point (see figure 5.II, "The 7V+1 of Big Data").

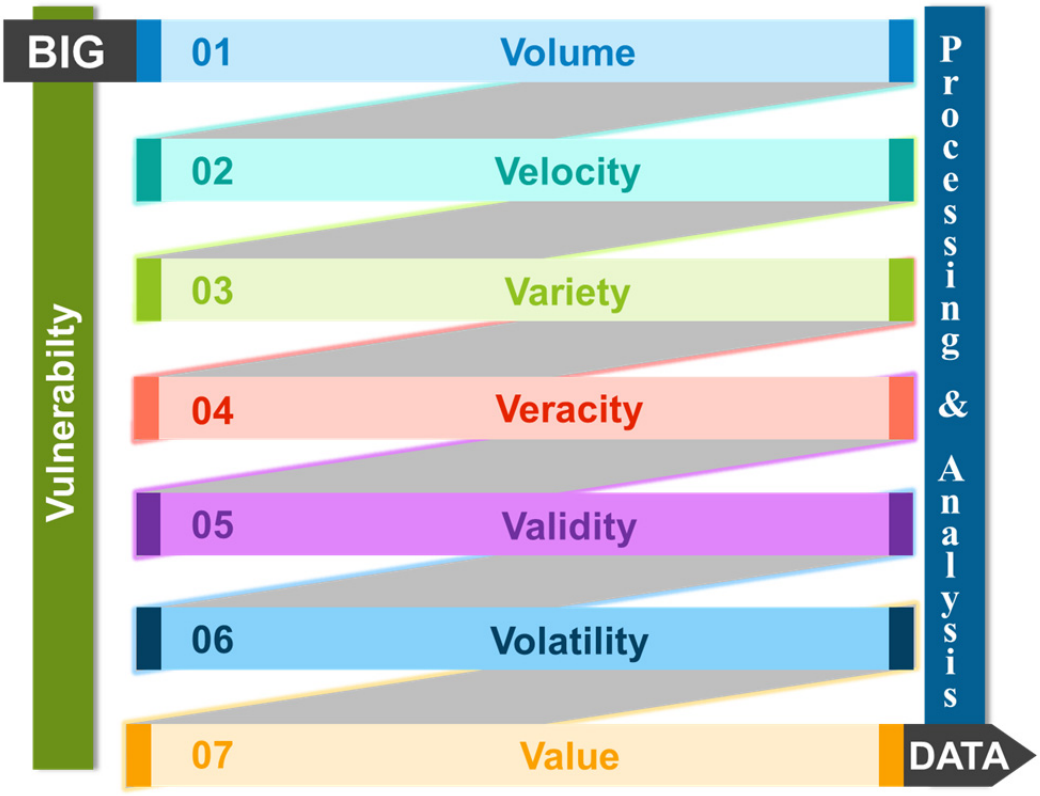


Figure No. 5.II. *The 7V+1 of Big Data*

According to Alex Pentland, director of MIT Human Dynamics Laboratory and MIT Media Lab Entrepreneurship, one of the most cited computer scientists, declared by Forbes as one of the top seven scientists in the world (https://www.forbes.com/pictures/lmm45emkh/6-alex-sandy-pentland-professor-mit/#db5e5041050c), Big Data's huge potential is that we can provide information about people's behavior instead of information about their beliefs or faith.

The results of Big Data analyzes can help us develop systems for personalized learning, equipment that can mimic human behavior or intelligence, develop virtual assistants, automation or create smart robots. They allow for the development of intelligent cities (Bhat & Ahmed, 2016; Chang, & Lo 2016) or driverless cars, can help us anticipate the place where a social movement will occur or predict where it will manifest and how it will spread influenza (Christakis & Fowler, 2010; Davidson, Haim & Radin, 2015).

The work and research of big data analysis specialists (Pentland, 2014, McAfee & Brynjolfsson, 2012; Boyd & Crawford 2011; Lohr, 2012; George et al., 2014) provides us with information about the hidden potential within these large datasets, but also about the traps we can fall into, such as the false correlation trap (Gandomi & Haider, 2015; Lazer et al., 2014). We also find information about the societal transformations that can be produced through their interpretation (Giannotti et al., 2012; Singh et al., 2015). Virtually all areas of

human activity can be transformed with the results/information obtained from the analysis of large data. in our opinion, the processing of such data is also essential for the development of modern education systems.

Their analysis allows us to predict how someone (a person, a group, or society) reacts in a particular situation, allows us to develop and implement new models of intervention to form desirable behaviors or to correct undesirable behaviors; a role in the formation and development of human personality, in its social and professional integration, according to the norms imposed by society (Bocoş coord., 2016).

The way we use the big data (control, protection, analysis/interpretation, etc.) will depend on the development of future digital societies (Zwitter, 2014), based on artificial intelligence, 21st century societies and those to follow. Big Data has the potential to transform all aspects of human life and activity - economic systems (Blazquez & Domenech, 2018), health (Wang et al., 2018) and education, social interaction and communication (Aharonya et al., 2011; Mani et al., 2013).

Humanity has a new weapon, the latent potential of which is like the atomic one: the Big Data analysis with the help of artificial intelligence, as well as the improvement/refinement of the latter by means of more and more efficient algorithms.

In this context of information and knowledge society, we could say that information is the sum of the influences exerted on a system, the set of data (related to persons, events, objects, ideas, processes, etc.) that once structured, processed and transmitted in a system - an organism, a machine, a society - has innovative influences in its activity or through which the system is preserved, thus building its behavior or actions. Information is data that has been processed so as to be significant to the person or the equipment receiving it (receiver) in a communication process in which the data is processed, in a cyclical manner.

Table No. 1.II. *Stages of the data processing cycle and their significance*

Phases of data processing cycle	Stage significance
Entry	– the stage in which raw data is prepared in a form that permits its processing
Processing	– the step in which reorganizing or rearranging data is produced - by people or by equipment/device - to increase their usefulness and add value for a particular purpose
Exit	– the stage in which the processed data are collected and in which significant information is derived about the person or equipment/device that receives it

In contemporary society, the formation of knowledge involves the possession of essential skills for the second literacy - digital literacy. Although at first glance it would seem that the skills we consider to be essential for digital literacy are complex acquisitions, we believe that they are needed in the process of digital skills training and desirable consumer digital behavior.

The essential skills needed for digital literacy are the batch of skills needed by an individual to use NICT under conditions of efficiency and safety. These abilities are used to find, find, collect, evaluate, articulate, adapt and process information, to use them in a critical and systematic manner, according to their relevance for the purpose of fulfilling tasks, interpersonal communication, individually or institutionally, to generate content and to develop opportunities for knowledge and action.

II.2.1. Educational resources in diachrony and their taxonomy

World history is marked by a series of discoveries and inventions, social movements, and revolutions, representing qualitative leaps that have opened new ages and eras, and in this context we will try to prove and argue that the need - more or less conscious and formalized - the existence of an organized education system has its origins since the emergence of human society in its early epochs.

In the following, we will try to make a classification from the perspective of the educational means according to the historical criterion. Our opinion is that in the development of educational means there were six major historical stages, closely correlated with the stages of human history, which we will call the following: *Prehistoric Stage, Antiquity Stage, Medieval Stage, Early Modern Stage, Modern Stage, Postmodern Stage, and Metamodern Stage*.

We will further insist on the prehistoric and the metamodern stage because we consider that they have not been sufficiently debated and we also want to emphasize that the necessity of an organized education system lies in the collective mind subconscious of the oldest times. We could even formulate a naturally subjective inference: the use of material means is not a purpose in itself, but an instrument that facilitates the realization of human activities and inter-/intra-subjective knowledge.

II.2.1.1. Prehistoric phase or prefiguration of the school institution, of chalkboard and writing[1]

The primary prehistoric stage is marked by the appearance of the first cave paintings. Cave painting or rock painting is a term that refers to the paintings on the walls and ceilings of caves, cliffs or boulders. Paintings on stones were made since the Upper Palaeolithic period, approximately 50,000 to 40,000 years ago. Currently, these paintings can be found in several European countries (France, Spain, Bulgaria, Romania, Germany, etc.) as well as in other continental countries. (https://dexonline.ro/definitie/altamira/519016, https://ro.wikipedia.org/wiki/Pictur%C4%83_rupestr%C4%83)

The prehistoric stage implied two periods::

a) Primary prehistoric period – drawings from the caves (approx. 30,000 BC)

The history of the primitive man is marked by a long period of inventions. One of the oldest inventions is writing, which created the infrastructure for the preservation and transmission of information, human knowledge, and communication over long geographical or temporal distances.

Figure No. 9.II. Cave painting from *Altamira, Spain* (https://en.wikipedia.org/wiki/Cave_painting)

Figure No.10.II. *Cave painting from Lascaux, France* (https://en.wikipedia.org/wiki/Lascaux)

[1] Baciu (2015). The evolution of educational means. A historical perspective Procedia - Social and Behavioral Sciences 180, 280 – 285. http://doi.org/10.1016/j.sbspro.2015.02.117

Figure No. 11.II. *Cave painting from Magura Cave, Bulgaria source: Wikipedia)*

Figure No. 12.II. *Cave painting from La cueva de las Manos, Argentine (source: Wikipedia)*

The paintings preserved on the walls of the caves or rocks in southern France (Lascaux, Chauvet), Romania (Coliboaia Cave), Somalia (Laas Geel), Argentina (La Cueva de las Manos), Bulgaria (Magura Cave) Altamira), etc., presents with great precision bison, hands, horses (Balter, 2011), deer, hunting scenes, rituals, plants, but also other spots or indescribable signs.

These caves, we think, prefigure the school as an institution (Baciu, 2015), indicate the need of mankind to have a settlement in which to keep for a long time the knowledge/information accumulated up to that time. In the paintings of the cave caves, bright colors were made of mineral powders (iron oxides, manganese dioxide, kaolin, coal) dissolved in various binders (saliva, animal fat, resins, vegetable juices, egg white, earth or coal), but also additives such as crushed bones. (https://www.smithsonianmag.com/travel/prehistoric-rock-art-visit-around-world-180952989).

In the paintings on the cave walls, the ability of the primitive man to work with images, symbols and signs is visible, we consider it a prefiguration of a writing system, a "proto-writing" (Robinson, p.12), used for transmission and recording rituals.

During this historical period, we can also notice the use of material resources in the painting and proto-writing activities. From the viewpoint of pedagogical terminology, these resources can be considered rudimentary educational means, so that, we can talk about a foreshadowing of the first educational means – the board – an invention which, along with writing, will leave its mark upon the whole development of humanity. This proto-chalkboard may be found in the form of cave walls, sea sand or earth on which one would presumably draw using sticks – a practice that we still find today in some tribes from Africa or Australia which did not have any contact with modern civilization until now.

In a similar way to the humans who lived in the Palaeolithic period, which we call the early prehistoric stage, these tribes convey knowledge through drawings made with a stick on the surface of the earth, which indicate the location of an animal that can be hunted, a water source, a religious ritual, etc. Although we cannot actually say this was a writing system, they represent a set of symbols, pictures or signs used to convey the necessary information in a tribal community. Another purpose of these images was to convey the art of hunting or secular/religious rituals to future generations.

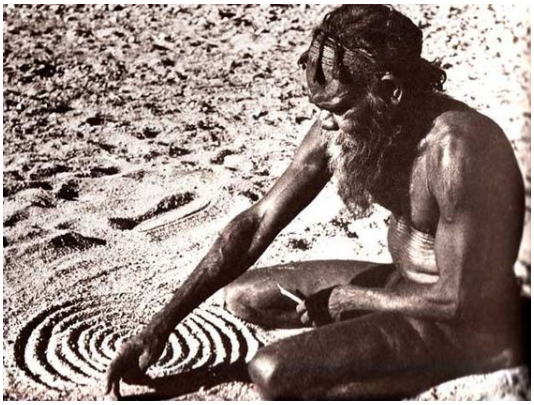


Figure No. 13.II. *Aboriginal drawing on the sand*

(photo taken in the 1940s, of the last century, in the center of Australia, source: https://ro.pinterest.com/pin/421508846357567222/)

The photo shows an Australian aboriginal drawing concentric circles, which could mean a camp site, a water source, or even a tjuringa (a sacred wood or stone object).

As a further argument in favour of our hypothesis, that at this stage we have a foreshadowing of school as an institution, "the cave school", we believe that the very lack of space for storing signs, images or symbols for a longer period of certain present-day African or Australian Aboriginal tribes has not allowed the development of a writing system and of the school for more than 50,000 years. These present-day tribes have not developed an educational system precisely because of the lack of the "school in the cave" (more exactly because of the lack of caves) and because they have not been able (like the Mesopotamian or the Mesoamerican civilization) to build structures which could withstand the test of time, thus not being able to preserve the special knowledge and accumulated information which could later lead to the development of a writing system. These arguments demonstrate the need for a space suitable for the development of a future educational system. The alternative "school hut" is not a viable support for the establishment of an educational system.

We consider that the structure of the writing form required the existence of premises that make it possible to invent it, writing is not a sudden invention, but rather it has developed on the basis of older traditions consisting of using a system of symbols and images which cannot be classified as their own writings. The totality of symbols and images, which led to the invention of writing, by selecting and structuring some of them, in the form of a written language/message (Noam, 2012), is known as “proto-writing”.

A secondary hypothesis, resulting from the analysis of prehistoric phase, is related to the way of living of a human community, characterized by the absence of establishments, and by nomadism, i.e. nomadic peoples can develop an educational system only when they change their migratory lifestyle. This will allow the structuring of a proper educational system. Nomadic populations which are settling among sedentary populations will hardly assimilate the educational system of these societies due to socio-cultural differences between these communities. Our view is that a closer investigation of this hypothesis may help solve some educational problems of contemporary societies. Thus, one may identify the psycho-socio-cultural factors that will determine these nomadic populations to develop an educational system appropriate to their cultures by assimilating knowledge from another educational system. At this point, we refer to the Roma community, as a particular case.

b) The Second Prehistoric stage is marked by the emergence of educational pseudo systems, of certain institutions referred to as schools, of the board, and of writing. Sumerians are regarded as the inventors of the first writing system, a system developed around 3500 BC. Moreover, the invention of the first writing system, the cuneiform writing, allowed them to develop the first educational system, a system that was based on an institution attached to the temple which was called edubbas, i.e. school. A large number of tablets which have been translated so far provides a revealing picture of the Sumerian school system. The administrator of a Sumerian school was referred to as ummia, meaning an expert, and the students were called the “school`s sons". Ummia’s assistants were called "the big brothers" and their task was to compose texts that the "school`s sons" had to emulate on clay tablets. At the same time, their mission was to verify if these texts were correctly transcribed. Generally, only boys could attend school. Only certain rich families had the right to send their girls to school. Students were attending school from sunrise to sunset. First, they learned to write and read the pictograms, but also to draw and to perform mathematical operations. Occasionally they learned about music or about heroes. If a student did not complete the requirements correctly, the penalty was flogging. Given the evolutionary steps that human communities,

regardless of the distance between them, we may say that the appearance of the first educational system led to the appearance of the first educational means: *the clay tablet.*

II.2.1.3. Metamodern stage[2]

The term meta-modernism, although introduced in 1975 by Mas'ud Zavarzadeh, which considers it an emergence from the aesthetic area, was not sufficiently founded. Recently, in 2010, the concept of metamodernism was (re)introduced by Timotheus Vermeulen and Robin van den Akker (2010) with references to the same field.

The first question that arises is whether this concept is only proper for aesthetics domain, or we could foresee a possible applicability and relevance in other areas, including the philosophical one. Some adjacent questions could be:

→ Why is it necessary to introduce a new concept, a new philosophical vision on the fundamentals of existence and of the world?

→ What else could this bring in addition to what exists at the moment as a philosophical reflection on the essence of the universe and the evolution of the contemporary world?

→ Is it really necessary a new philosophical vision to build a new interpretative system about the Universe?

→ Is this concept different from postmodernism or just a new philosophical concept artificially introduced, one which will not leave traces?

All these justified questions require an answer, an initiation/achievement of interpretative analysis and a construction of interpretative systems.

In our view, metamodernism is not just a simple reaction to postmodernism and does not remain only at the stage of the conflict, of ongoing denial or question about concepts or theories. Metamodernism is that trend which attempts to unify, to harmonize and to settle the conflict between modern and postmodern by supporting the involvement in seeking solutions to problems and the desired positioning towards existing theories, not only combating or questioning them.

When Vermeulen & Akker (2010) refer to the prefix meta, they retain as connotation the ancient Greek meaning of "with", "between" and "beyond". We propose the extension of

[2] Baciu et al. (2015). Procedia - Social and Behavioral Sciences 209, 33 – 38. http://doi.org/10.1016/j.sbspro.2015.11.226

its meaning, adding new and current significances such as change, transformation, metamorphosis and the sense used in informatics "about".

Meta- = relating to change: used with some adjectives, verbs, and nouns;

Metamorphosis = the process of changing into something completely different;

Metalanguage = a form of language or set of terms used to describe or analyze another language.

By adding these new meanings, we can say: metamodernism represents the trend that characterizes contemporary societies, being the expression of a new philosophical vision to the existential problems, a vision that leaves its mark on their approach and resolution.

In terms of historical evolution, metamodernism is a stage that comes after postmodernism, because it is not possible to set a clear spatiotemporal boundary between them.

Metamodernism is the stage where one gives up to the skepticism that is specific to postmodernist thinking, proposing the pacification and reconciliation between modernity and post-modernism, and of the postmodernism with itself. It is the phase when not the critic and the problematization is the key, but the constructive effort to find solutions to societal issues. It promotes an anticipatory and proactive thinking, "how will it be in the future if", "what can we do to ..." a positive, meditative, reflective, logical, active and proactive thinking.

By adding these new meanings, we can say: metamodernism represents the trend that characterizes contemporary societies, being the expression of a new philosophical vision to the existential problems, a vision that leaves its mark on their approach and resolution. In terms of historical evolution, metamodernism is a stage that comes after postmodernism, because it is not possible to set a clear spatiotemporal boundary between them.

Metamodernism is the stage where one gives up to the skepticism that is specific to postmodernist thinking, proposing the pacification and reconciliation between modernity and post-modernism, and of the postmodernism with itself. It is the phase when not the critic and the problematization is the key, but the constructive effort to find solutions to societal issues. It promotes an anticipatory and proactive thinking, "how will it be in the future if", "what can we do to ..." a positive, meditative, reflective, logical, active and proactive thinking.

Through a diachronic analysis about the evolution of philosophical reflections related to the existential problems, we can identify three interpretative systems and philosophical trends, which are naturally scheduled and partially overlapped: modernism, postmodernism, and metamodernism – as it can be seen in the following table:

Tabel no. 2.II. *Map of attitudes specific to the three philosophical trends*

Attitudes	Modern	Postmodern	Metamodern
Reflexive attitude	√	√√	√√√
Interrogative attitude	√	√√√	√√
Metacognitive attitude	√	√√	√√√
Proactive and projective attitude	√	√√	√√√
Critical attitude	√	√√√	√√
Optimistic, positive and open attitude	√√	√	√√√

In our view, each of the three trends has a specific contribution to the creation of the interpretative/explanatory systems of societies' problems. At the same time, we support the idea that none of these trends excludes the presence of the others two and denies their specific contribution to the ensuring of the general development. To capture the dominants of these three trends, we have identified six common characteristics, with differentiated emphasis from one another. In a primary attempt of quantification, we have elaborated in tabular form a map of the attitudes that each trend holds, highlighting the weight of each.

We consider that a reference criterion for comparing the three currents is the attitude of the individual, as well as the positioning of the truth value. In our view, in postmodernism, the predominant attitude is pessimistic, denial of truth, and in meta-modernism, on the contrary, the optimistic attitude of easy acceptance of the truth is predominant. As far as modernism is concerned, it is characterized by indecision, hesitance, and fluctuating attitude of accepting and rejecting the value of truth, with alternations and fluctuations between an optimistic or pessimistic attitude.

These implications were also underlined by author M. Komańda (2016), who proposes a structure in an essential table form of the features of postmodernism and meta-modernism.

Table No. 3.II. *Comparison of postmodernism and metamodernism in view of challenges of the social sciences (after Komańda, 2016)*

Criterion	Postmodernism	Metamodernism
Description of reality	Lack of meta-narration; there is only the individual perception and comprehension of reality	Search for narration based on intersubjectivism
Method	Deconstruction	Reconstruction
Organisation of social behaviours	The lack of formal organisation, possible spontaneous and temporary bottom-up organisation	Deliberate, bottom-up and, first and foremost, informal organisation which may turn into other forms

II.2.2. Study and dissemination of educational resources

II.2.2.1. The means of education and their evolution

Education means are the set of natural materials (objects from the surrounding reality in their natural form) or intentionally made (models, plans, maps, manuals, etc.), which support the mediation of the training and the realization of the instructive-educational activities, according to a set of requirements pedagogical selection and integration into the didactic strategies in systemic view (Bocoş & Jucan, 2007).

The operationalization of the tools to be used in the study from a diachronic perspective the evolutionary history of the educational means facilitates the following clarifications:

- The concept of the education means is used in the integrating sense, including the material resources used in human activities, starting from the prehistoric stage and subsequently in the educational acts and in the educational activities with increasingly complex objectives;
- The analysis of the problem of the education mean is required to be multidimensional, by corroborating the technical, pedagogical, educational, curricular, social, cultural, religious and other considerations. Of course, we treat complex relationships that can be explained and detailed analytically, in stages, historical periods, from certain angles of analysis, etc.

II.2.2.2. Education resources - the superordinated concept of the education means

In the literature, there are several definitions related to educational resources, depending on the point of view of the problem approach. In the following, we propose to give our own definition of educational resources, having as a starting point the definition of the term “resource” in the field of economic sciences in a inter-correlation with the definition of the concept of education, the purposes of education, as well as the taxonomy of education resources offered by Muşata-Dacia Bocoş (2017).

Next, during the sub-chapters II.2.2.2.1., II.2.2.2.3., II.2.2.2.4., II.2.2.2.5., there is a brief presentation of each type of resources (human resources, material resources , resource resources, time resources, Internet resource) with the mention that, in our view, the notion of resource in the field of educational systems can be understood at the macro-pedagogical level - when it refers to the national education system as a whole or at a micro-pedagogical level -

when referring to an institution within it. Also, in Figure No. 16.II. we have graphically illustrated the taxonomy of educational resources, which, through effective integration in teaching strategies, supports the achievement of the educational-educational activities and the achievement of the educational goals.

II.2.2.2.6. Internet resource and its parts

Recent scientific and technical discoveries legitimate the wording of the following question: *Is the Internet a material resource, a means of education or just a virtual space that facilitates the teaching-learning-evaluation process?*

In order to answer this question, we proposed to adopt a new perspective on the concept of an educational resource in the particular case of the Internet. In connection with this, we identify the following categories of specific resources: *the Internet resource, digital educational resources, open educational resources.*

Next, we present them, providing examples for the educational field.

a) The Internet resource

In some specialized papers, the Internet is given a privileged place, being considered - from a technical and material point of view - as an independent educational resource such as financial, human, procedural resources, etc. Hence, the existence and use of the Internet is strongly conditioned by the availability of equipment (computers, smartphones, tablets, routers, servers, etc.). At the same time, the Internet is a resource that provides us with a virtual space that allows the development of online educational activities, using the facilities offered - databases, online platforms, software, open educational resources, etc. This explains the inclusion of the Internet within the material resources, virtual space being seen as an extension of the physical school space in cyberspace.

Given this dual perspective, we believe that a multi-criteria analysis is required and that we can formulate the following:

a. The Internet - viewed from the point of view of the dissemination of resources - is the component of the material resources that provide the virtual space necessary for the development of the online educational-educational process.
b. The Internet - viewed from the point of view of the physical components that form it as a whole (worldwide network) - is the means of education that provides the support of the educational activities.

c. Digital didactic materials (digital textbooks, videos, software, etc.) disseminated via the Internet are components of educational means, considered educational resources that can be used for multiple purposes: information, study, problem-solving, learning, procurement, dissemination of information, etc.

Synthesized, the ones outlined above are illustrated in figures no. 17.II. and 18.II., in which we have tried to point out that the interconnections assured and promoted in the virtual space - via the Internet - are indispensable to a knowledge society such as contemporary society - the digital society.

Therefore, from the pedagogical point of view, the Internet has a dual status, being a means of learning and virtual learning space at the same time. That is why we could say that the Internet represents more than what its classic definition - the international computer network - contains.

In our opinion, the Internet represents the material educational resource and the educational means of the world-wide information network that provides the virtual space necessary for the design/development, study, storage, dissemination of digital learning materials and resources, exchange of data and information, the development of educational processes.

b) Digital educational resources

Digital educational resources are the set of digital teaching materials - graphic images, photos, animations, audio or video files, videos, games, software, etc. - which educational agencies use in educational-educative processes in order to achieve pre-established educational objectives.

c) Open Educational Resources (RED)

Under c.2, we have made an iconic representation of the interrelationships and interdependencies between the eight criteria ("The Professional Prestige of the Author", "Accuracy", "Objectivity", "Update", "Informative Potential", "Audience", "Design", "Accessibility, Navigability and Costs") involved in selecting, studying and evaluating web resources can be illustrated as a rosette made up of eight related petals, as shown in the figure below:

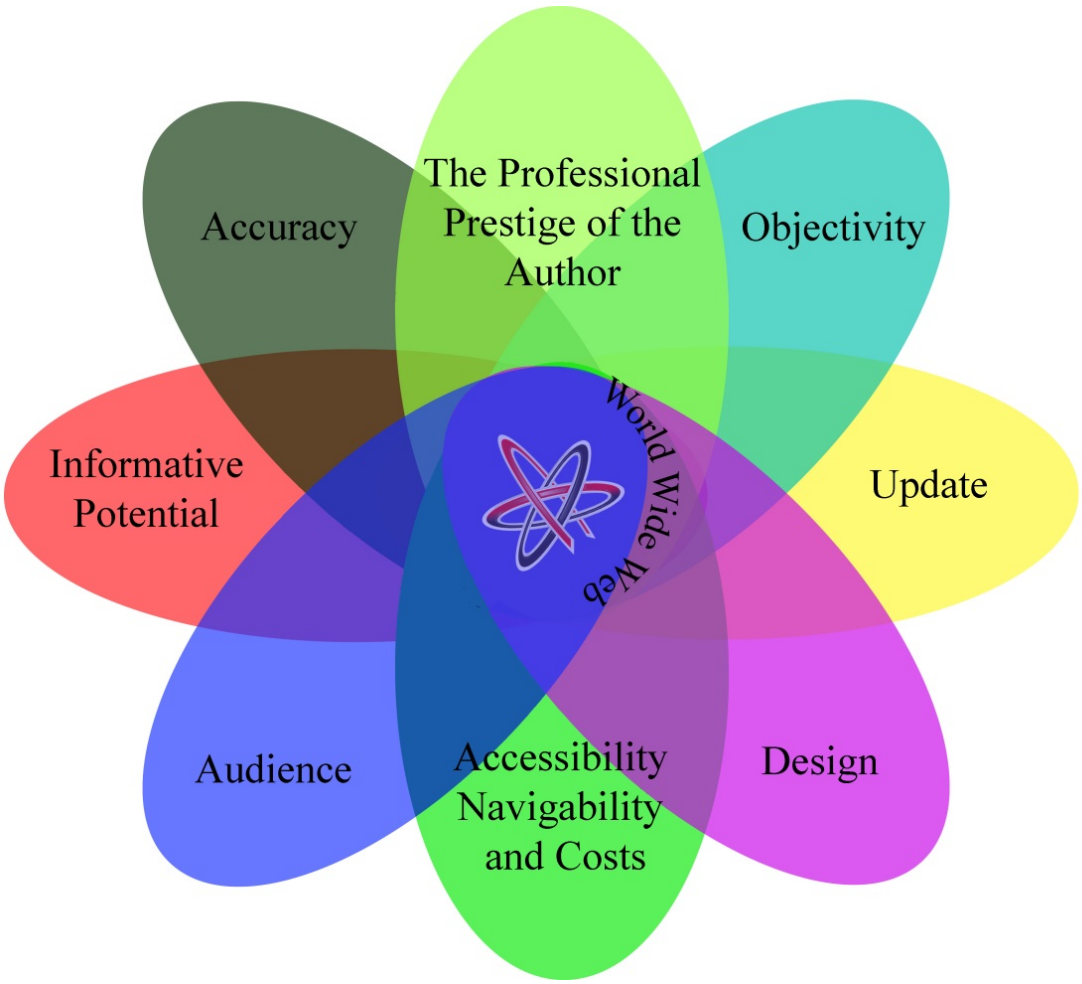


Figure No. 17.II. *Rosette of evaluation of the educational resources*

(from: Instrument operationnel d'évaluation de la qualité intrinsèque des réssources éducationnelles libres, Baciu, Bocoș, Andronache, Bocoș, 2015, http://colloque2015.rifeff.org/fr/papers/search)

Chapter III

DIGITAL RESOURCES IN CONTEMPORARY EDUCATION. CONCEIVING AND USING AN EDUCATIONAL PORTAL – CASE STUDY: *PRE* PORTAL

Over the course of several subchapters, there are presented: the interaction between digital technologies and cyber-navigation, the educational portal and the educational platform - correlative terms, as well as a description of the components of the Educational Resources Portal (PRE).

III.1. The interaction between digital technologies and cyber-navigation

The use of digital technologies allows the establishment of student-computer interaction and thus access to diverse, modern and attractive teaching strategies. Given that cybernavigation allows new information to be acquired in a variety of organizational, structured and visualized ways, electronic curriculum resources support the use of a wide range of cognitive and metacognitive strategies. Therefore, we emphasize that computer itself as a means of material education, even if it allows multimedia services, does not produce immediate pedagogical effects, but the quality of the programs created (Dobrescu, 2010 https://vdocuments.site/curs-iac-558c82e659734.html) and appropriately circulated, electronic resources, computer products, integrated according to certain pedagogical requirements in educational activities.

Therefore, the modernization of computer-assisted training presupposes integrating the following requirements:

a) the existence of modern hardware and electronic equipment;
b) the existence of software resources (programs) or courseware with which electronic resources can be developed;
c) holding by the teaching staff of the competence:

- designing educational activities that exploit digital technologies in teaching, learning, and evaluation;
- pedagogical mediation of computer-aided training and self-training and facilitation of mediated interaction: didactic-computer-educated;
- using digital teaching, learning and evaluation technologies, and building specific learning situations in the instructional environment;

d) holding by learners (students) of digital competences in (self) learning and (self) evaluation;

III.2. Educational portal and educational platform – correlative terms

In order to organize the multitude of websites on the Internet, in the last period, it has been necessary lately to create new information management systems, depending on the interests of the users of a particular domain. Thus, in the field of education, information concentration points have also emerged in order to facilitate information and documentation management, known as the educational portal.

An education portal is a collection of specially designed websites that are a unique access point for educational information. Sometimes, from this unique point, user authentication is also done based on a user ID and password. This authentication gives it the right to access all of the services offered: information, dissemination, search, reading, updating, adding and customizing content. depending on the roles that users have (teacher, student, student, visitor, moderator, etc.), the portal offers selective access to services.

Subordinate to the portal concept, one of its components may be the electronic/computer/online platform, understood as a software product that has implemented various internal procedures, such as: accessing and using information sources and data by users; posting documents (for example, texts, tutorials, courses, etc.); consultation/study of documents; synchronous (online) and asynchronous (offline) communication organizing forums; collecting statistical data, and so on.

In the educational field, we are talking about an *educational platform*, understood as a software product that supports teaching, learning, testing, evaluation, digital content management, management and monitoring of the entire educational process. Educational platforms provide functionalities for all actors involved in the educational process: pupils, educators, parents, managers of educational institutions, auxiliary teaching staff. Thus, electronic platforms provide adequate support in the areas of decision making, control, planning, monitoring, evaluation, forecasting, etc.

III.3. Description of the parts of the Educational Resources Portal (PRE)

In this subchapter, the main components of the PRE educational portal are described, which can be found on the following web address: www.edusciences.org.

a) *Educational forum* part

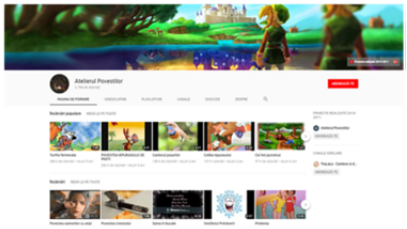
b) *Social platform* part

c) *Education 21 Journal* part

d) *E-mail service* part

e) *Scientific events* part

f) *Youtube channel – Tales workshop* part



Part II

PRACTICAL-APPLICATIVE DILIGENCES

Chapter IV

PRESENTATION OF THE EXPERIMENTAL RESEARCH "INFLUENCE OF A BATCH OF DIGITAL RESOURCES IN THE PROCESS OF PRIMARY ANALYSIS BY THE STUDENTS"

IV.1. General presentation of the research

Taking into account the initial training needs specific to these specializations, the topics, and activities for the documentation, study, conception, and use of educational resources, as well as the use of online platforms, have been integrated into the curriculum of these disciplines.

Our systematic observations over the last academic years have led us to a series of conclusions about how students use online resources. Of these, we have been concerned with the conclusions of documenting and studying the documents, and the objectivity of the criteria they use when selecting the educational resources needed to produce the various products required in the educational contexts. Documentation and information management competencies are important parts of the system of professional competences of teachers and their specialized and general culture.

Table No. 1.IV. *Features an effective documenting activity*

A feature of efficient documentation	Explanation
- selectivity	- is based on the selection of relevant online and offline resources (books, studies, articles, monographs, encyclopedias, treatises, dictionaries, OCW courses, etc.)
- fundamenting on original sources	- it is recommended to use the primary sources, in order to correctly decode the meaning of the original message (undistorted by subsequent subjective interpretations
- active, interactive, proactive, reflexive, and interrogative attitude	- it is recommended to exploit the desire to know and discover curiosity, reflexivity, questioning, problem-solving and problem-solving, creativity, full involvement (cognition and affective), proactivity etc.

- critic attitude	- the analysis with reserves, skepticism, and rationality of the consulted resources is recommended, to practice the critical spirit, to identify possible distortions, to check whether the data provided can be found in other researches or contexts
- impersonal and objective attitude	- it is recommended to avoid preconceived ideas, prejudices, political or religious beliefs, or national or regional traditions - It is recommended to avoid empirical approaches and to promote scientific ones
- continuous character	- continuous documenting activity is recommended in order to update the information held in accordance with the new discoveries or researches in the field

IV.2. Research questions

Q_1 – To what extent do the students use the scientific criteria related to the author, provided by the researcher, for the primary evaluation of the digital resources and for the attribution of the scientific character?

Q_2 – Organizing seminar activities based on thematic discussions and exemplary exercises on the scientific criterion "Professional Prestige of the Author" in the primary evaluation of digital resources in the Internet Sphere contributes to the improvement of student decisions in the process of determining the scientific character of these resources?

Q_3 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's name* in the primary evaluation of digital resources in the Internet sphere contributes to the improvement of student decisions in the process of determining the scientific character of these resources?

Q_4 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's institutional affiliation* in the primary evaluation of digital resources in the Internet sphere contributes to the improvement of students' decisions in the process of determining the scientific character of these resources?

Q_5 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's contact data* in the primary evaluation of digital resources in the Internet sphere contributes to the improvement of students' decisions in determining the scientific character of these resources?

Q_6 – The organization of seminar activities based on thematic discussions and exemplary exercises *on the relevance of source verification cited by the author in another article or in another book printed* during the primary evaluation of digital resources in the

Internet sphere contributes to the improvement of students' decisions in the process of determining the scientific character of these resources?

Q_7 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of the *author's notoriousness* in the process of primary evaluation of digital resources in the Internet sphere contributes to the improvement of students' decisions in the process of determining the scientific character of these resources?

IV.3. Purpose and goals of the research

Purpose of the research

Analyzing the influence of a set of scientific criteria on the author and publishers on the decision of students in establishing the scientific resource of digital resources.

Goals of the research

G_1 – Verifying the extent to which students use the author's criteria offered by the researcher to identify the distortions in digital resources and to correctly assign the scientific character

G_2 – Analyzing students' decisions in the process of determining the scientific character of digital resources, as a result of knowing some criteria regarding the author (name, institutional affiliation, contact details, the extent to which his / her assertions can be verified in another publication, notoriety), to identify distortions

G_3 – Student awareness of potential distortions (articulation is not in accordance with scientific and technical data) from the content of digital resources

IV.4. Hypotheses and variables of the research

The general hypothesis (GH)

The organization of seminar activities based on thematic discussions and exemplary exercises on the “Author's professional prestige” scientific criterion in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

The secondary hypothesis of the research (SH)

Based on the chosen criterion, we identified five subcriteria that are indicators of its operationalization and, subsequently, we formulated five secondary hypotheses:

SH_1 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's name* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

SH_2 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the institutional affiliation of the author* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

SH_3 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the contact details of the author* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

SH_4 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the verification of sources cited by the author in another article or other printed book* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

SH_5 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's reputation* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

Variables of the research

The independent variable: the organization of seminar activities based on thematic discussions and exemplary exercises related to “Author's professional prestige” the scientific criterion in the primary evaluation of digital resources in the Internet domain.

The independent variable for secondary hypotethesis SH_1

SH_1 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's name* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

The independent variable for secondary hypotethesis SH_2

SH_2 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the institutional affiliation of the author* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

The independent variable for secondary hypotethesis SH_3

SH_3 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the contact details of the author* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

The independent variable for secondary hypotethesis SH_4

SH_4 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the verification of sources cited by the author in another article or other printed book* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

The independent variable for secondary hypotethesis SH_5

SH_5 – The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's reputation* in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

The dependent variable: the quality of student decisions in the process of determining the scientific nature of digital resources in the Internet domain.

IV.5. Presentation and description of the target group

The experimental research involved students from the 1st year of Primary and Preschool Education Pedagogy specialization, registered in Cluj-Napoca, as well as university extensions in Târgu Mureş and Năsăud. The target group was composed of 603 students, all participating in the pre-experimental stage, a number of 572 students participated in the

formative experiment stage. The composition of the group of participants, according to the place where they study and the form of education, is presented in the table below.

Table No. 2.IV. *Sample of participants in the research*

Pedagogy of primary and preschool education		
Cluj-Napoca	Năsăud	Târgu Mureş
265	186	152

The group of participants was composed of students aged between 19 and 40 with an average age of 21 years. Almost exclusively, the group was made up of girls, these being the majority of the PIPP specialization, respectively, of the 603 students, four of which were of the biological male gender. From the point of view of the general training and digital competences, their general level was similar regardless of their specialization, form of education and the locality where they are studying.

IV.6. Research methodology

In our research, we used a system made up of the following research methods: didactic experiment, questionnaire survey, observation.

The main research method was the didactic experiment, which involved testing the efficiency of a seminar system based on thematic discussions and example exercises related to the criteria of primary evaluation of digital resources in the Internet sphere on the quality of students' the correct attribution of scientific/pseudo-scientific character.

IV.7. Research instruments

The application of the research methods presented by us was possible due to a system of research tools for collecting data in the different stages of research, a system consisting of self-checklist; evaluation questionnaire, investigation questionnaire, as can be seen in Table 3.IV.:

Table No. 3.IV. *The correspondence research methods – research instruments*

No.	**Research method**	**Research instrument**	**Instrument type**
1.	Observation	Self-checklist	Own conception
2.	Inquiry	Electronic exploration questionnaire	Own conception
3.		Investigation questionnaire	Own conception

IV.8. Research stages

IV.8.1. Pre-experimental stage

The pre-experimental stage included activities to observe the students' behavior in the first year in the context of documenting and studying digital resources in the last three weeks of the 1st semester. In this phase, 603 students of the first year from the specialization of the Pedagogy of Primary and Preschool Education (regular and distance education), enrolled in Cluj-Napoca, as well as at the university extensions in Târgu Mureş and Năsăud.

IV.8.2. Formation experiment stage

The strategy of the stage of the formative experiment has integrated the formative didactic intervention methods identified by us as a result of the pre-experimental stage data collection, by administering the individual self-checklist. The main educational goals we pursue at this stage aimed at students:

- awareness of the dangers of digital resource distortions (fake news, propaganda, manipulation, etc.);
- their awareness of the importance of using scientific criteria for the pre-evaluation of digital resources in the Internet sphere;
- familiarizing them with some of the most commonly used scientific criteria for assessing digital resources;
- streamlining time management in their information and documentation process;
- the formation of necessary skills in scientific research;
- streamlining the entire process of information and documentation, ensuring its scientific character.

In order to achieve these goals, a system of eight seminar activities was introduced as an *experimental factor*, in which the didactic-researcher made presentations and analyzes of digital resources.

At the beginning of these seminar activities, students were introduced to scientific or pseudo-scientific resources for primary analysis and evaluation to assess the state they are in, from the following points of view:

- the extent to which it performs critical analysis of these resources;
- if it identifies and uses criteria in the pre-evaluation process.

Also, in these activities, didactic sequences were organized to explicitly present basic scientific criteria necessary for the primary evaluation of the scientific nature of digital resources. These sequences were merged with teaching sequences where students viewed short PowerPoint presentations and sequences in which they analyzed short printed documents. The purpose of these didactic activities was to familiarize students with the need to use criteria for evaluating documentation and information resources.

At the end of these thematic discussions and presentations, a *didactic instrument* of its own conception was conceived and applied as a way to fix the new acquisitions. It included the explanatory schema of data collection and processing, articulation of information for the purpose of forming a message, its front presentation being made using the PowerPoint program (see Figure No. 1.IV.).

This didactic tool has as the main purpose to present the stages of message forming, which underlie the formation of resources, with emphasis on the articulation of scientific resources. As shown in our figure, they occupy the highest status in the category of information and documentation resources. in the case of resources that are not articulated in accordance with scientific and technical data, the distortion in content is imminent, which has negative consequences on the whole information and documentation process and on other subsequent steps. This category of resources is classified by us as *pseudo-scientific resources*.

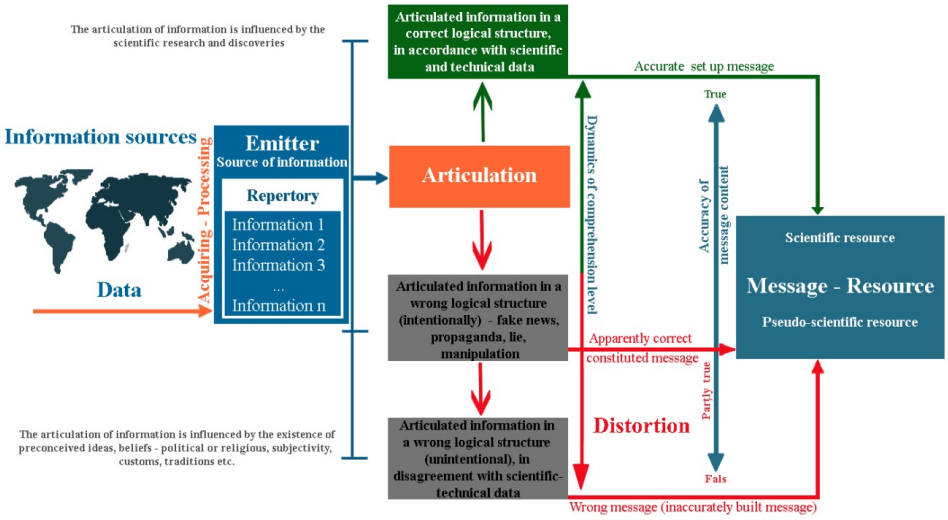


Figure No. 1.IV. *Information articulation scheme in messages structuring*

(Baciu, 2017. The didactic instrument used in the formation experiment stage)

IV.8.3. Post-experiment stage

In the post-experimental stage, systematic observations of the students' digital behavior in the seminar activities were realized. An evaluation questionnaire was also developed, through which we aimed to verify the level of development of digital behaviors as well as the extent to which the students have acquired a sustainable/solid approach and use the scientific control criteria for the primary verification of the scientific nature of digital resources.

Chapter V

PRESENTATION AND ANALYSIS OF THE OBTAINED RESULTS

V.1. Presentation and analysis of the results referring to the students' digital behavior in the information and documentation activity (on research stages)

V.1.1. Results of the pre-experimental stage

At this stage, identifying observable behaviors exploited in the cyber documentation and digital resource study, a self-checklist was used, representing an inventory of scientific criteria related to the primary pre-evaluation/evaluation of digital resources. Since for each of the criteria of the self-checklist the respondents were asked to select the correct answer ("Yes" or "No"), then we present the descriptive results obtained for each question.

Below we will selectively present a few sequences from the research results.

V.1.1. Results of the pre-experimental stage

Question No. 1:

For the primary evaluation of the scientific character of a resource is it indicated to check *the author's name*?

Table No. 1.V. *Descriptive statistics for question No. 1 (pretest)*

		Frequency	Percent	Valid Percent	Cummulated percentage
Valid	False (Not necessary)	72	11.9	11.9	11.9
	Correct (Necessary)	531	88.1	88.1	100.0
	Total	603	100.0	100.0	

Question No. 5:

For the primary evaluation of the scientific nature of a resource, is it necessary to verify the *author's notoriousness*?

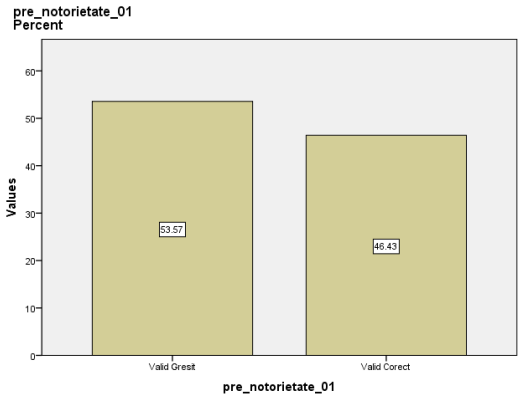


Figure No. 5.V. *Graphic representation of responses to question No. 5 (pretest)*

V.1.2. Results of the formative experiment stage. Checking correlations (selective presentation)

At this item in the doctoral thesis, there are presented some of the experimental intermediate results, with emphasis on the statistically significant results.

V.1.3. Results of the post-experiment stage

In the post-experimental stage, in order to identify the degree of acquisition of scientific control criteria for the primary verification of the scientific nature of digital resources the evaluation/evaluation questionnaire was applied. It was verified the level of development of digital behaviors as well as the extent to which students have acquired a sustainable/solid approach and use the scientific control criteria for primary verification of the scientific nature of digital resources.

V.2. Statistical data regarding the comparativeness of the results obtained in the post-experiment stage and those in the pre-experiment stage

Table No. 35.V. *Results of the McNecmar test*

McNecmar Test	
Pretest-Posttest	
Question No. 1: For the primary evaluation of the scientific character of a resource is it indicated to check the author's name?	**χ^2(N=572)=28,058, p<0,0001**
Question No. 2: For the primary evaluation of the scientific character of a resource is it necessary to check the existence of information about the institution the author comes from, the *institutional affiliation*?	**χ^2(N=572)=28,955, p<0,0001**
Question No. 3: For the primary evaluation of the scientific character of a resource is it necessary to check *the existence of an e-mail address to contact the author*?	**χ^2(N=572)=40,265, p<0,0001**
Question No. 4: For the primary evaluation of the scientific character of a resource is it necessary to check *if the quoted sources can be checked in another article or another printed book*?	**χ^2(N=572)=89,768, p<0,0001**
Question No. 5: For the primary evaluation of the scientific character of a resource is it necessary to check *the author's notoriousness*?	**χ^2(N=572)=47,439, p<0,0001**

Chapter VI
CONCLUSIONS

VI.1. Research conclusions

As an original didactic contribution, we refer to the design and use of an information articulation scheme in message structuring, used in the experimental stage to familiarize students with how to articulate information in a scientific or pseudo-scientific message.

The operational premise of the doctoral thesis is that the digital competence system is a complex one, consisting of interrelated components (competences and sub-competence), which gradually form, gradually over time. One of the components of this system is the correct information and data protection competence that we target through our investigations. As in the current society, most sources of information come from the online domain (mass-media, social networks, virtual libraries, educational platforms, MOOCs, etc.), in our research we intend to study:

- students' behavior in cyberinformation and cyber documentation;
- students' behavior in the primary evaluation of digital resources;
- the set of criteria (communicated/studied or self-identified) resource evaluation;
- way - conscious or unconscious - in which they use these criteria;
- the ability to sense distortions in some of the presented materials.

The premise of our research is that the process of assessing the scientific character of digital resources is a very complex one that is based mainly on the cumulative use of a set of criteria, some of which are presented in the theoretical section of the paper. Among these criteria, for a more in-depth experimental research, we have analyzed the "Author's professional prestige" criterion and have argued this option (see subchapter IV.4.).

Quantifications of this criterion were made at the onset of the research, in the experimental stage and in the post-experimental stage, with the help of own design tools, which showed a good and good Alpha Cronbach internal consistency coefficient. Subsequently, statistical analyzes were carried out to determine the significance of the difference between frequencies with the χ^2 test and the McNemar test.

The general hypothesis of our research was:

The organization of seminar activities based on thematic discussions and exemplary exercises on the "Author's professional prestige" scientific criterion in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

The independent variable was the organization of seminar activities based on thematic discussions and exemplary exercises related to "Author's professional prestige" the scientific criterion in the primary evaluation of digital resources in the Internet domain.

The dependent variable was the quality of student decisions in the process of determining the scientific nature of digital resources in the Internet domain.

The mathematical and statistical apparatus for processing and interpreting the results included calculating frequencies, percentages, Alpha Cronbach internal consistency coefficient, χ^2 test, McNemar test, and statistical processing programs were Excel and SPSS.
Since the "Author's professional prestige" scientific criterion is a complex, composite, which has multiple dimensions, based on the general hypothesis of the research, we have formulated five hypotheses that have been tested and for which we offer in this chapter the related conclusions.

In order to establish the conclusions regarding the confirmation/refutation of the secondary hypotheses, we realized:

- intragroup comparisons between the results obtained in the posttest and the pretest test;
- analyzes of results recorded in the experimental stage formation.

Given the large sample size of students (603 with post-test data from 572 students), the main research method was the survey, and the research tool the questionnaire; thus an experimental exploratory questionnaire was applied in the experimental stage formation, and in the post-experiment stage an evaluation questionnaire (see subchapter IV.7.). Along with these questionnaires, a self-test list was used in the pre-experimental stage, as well as a didactic tool designed by us to facilitate understanding of how messages were structured, as well as to observe students' digital behaviors.

The mathematical and statistical apparatus for processing and interpreting the results included calculation of frequencies, percentages, Alpha Cronbach internal consistency coefficient, χ^2 test, McNemar test, and the statistical processing software was Excel and SPSS.

Since the "Author's professional prestige" scientific criterion is a complex, multi-dimensional composite, based on the general hypothesis of the research, we have formulated

five hypotheses that have been tested and for which we offer in this chapter the related conclusions.

In order to establish the conclusions regarding the confirmation/refutation of the secondary hypotheses, we realized:

- intragroup comparisons between the results obtained in the posttest and the pretest test;
- analyzes of results recorded in the experimental stage formation.

VI.1.1. (2.;3.;4.;5.) Conclusions related to the secondary hypothesis: SI_1, SI_2, SI_3, SI_4, SI_5

The organization of seminar activities based on thematic discussions and exemplary exercises on the relevance of *the author's name, the institutional affiliation of the author, the contact details of the author, the verification of sources cited by the author in another article or other printed book, the author's reputation*, in the process of primary evaluation of digital resources in the Internet domain, significantly improves students' decisions.

VI.2. General conclusions

The general premise of the doctoral thesis is that New Information and Communication Technologies (NICT) have created the conditions for the emergence of *the knowledge society* – a society that is based on knowledge and the generalization of knowledge communication. Hence the role of the educational society, the learning society and the innovation society. In its turn, the knowledge society is possible given the existence of *the informational/computerized society*, from which it can not be separated and on the canvas to which it appears. It can be considered that a society is informational only if the number of people, structures and institutions that are currently using information technology exceeds a critical value, ie only if the access to computer/digital resources becomes a mass phenomenon. A well-developed information society is a foundation on which *digital society* develops, where citizens become digital citizens, governance becomes e-government, services turn into e-services, etc.

The Internet and everything derived from the ways of using it has led to transformations in both the generation of new programs and the equipment through which we connect to this global network. These transformations are mainly due to the desire of the

communicator as quickly and as easily as possible synchronously or asynchronously to access resources and information without spatial constraints, time and material.

The systematic use of digital resources implies the possession of competences in the field of information and communication technology, namely digital competences, which are formed in the educational processes, are practiced in various formal, non-formal and informal educational contexts, developing and refining, as a result of exercise. Thus, the European formation profile integrates a transferable and multifunctional competency package that needs to be developed through the completion of compulsory education, skills that all individuals need as a foundation for lifelong learning. This profile groups key competencies across eight training areas, one of which is *digital competence*. Therefore, the education system - with all its levels: primary, secondary, high school, university, is directly and decisively involved in the foundation of the information society, through the goals explicitly aimed at the formation and development of digital behaviors and competencies.

Digital competences are a component of the system of transversal competencies, which must characterize, according to the regulations in force of the European Commission, the European citizen and the universal citizen of the current society - postmodern and meta-modern.

VI.3. Research limitations

The main limitations in the design and implementation of the present research were related to the following aspects:

- A large number of research participants and the extended amount of time in which it occurred hampered the application of the independent variable, namely the organization of seminar participation based on thematic discussions and exercises example on criteria recoverable in the primary evaluation of digital resources in the field Internet. Achieving experimental research over a two-year academic year has created difficulties in controlling the independent variable over a long period of time and on a large group of students.
- The topic is difficult to investigate given the multidimensional character of human behavior, therefore, of digital behavior. The analysis of the latter would be desirable to consider the action of other psychological and contextual factors involved in the pre-evaluation of digital resources and training in the behaviors and digital skills.

- The sample of participants integrated students from a single specialization, namely "Primary and Preschool Education Pedagogy", regular and distance education, with an average age of 21 years.
- The sample participated mainly female - 568 of the total of 572 participants, representing 99.3%, given the specificity of the university specialization mentioned above.
- The researcher's difficulty to conduct research and make management of all activities that it has assumed, in three different locations - Cluj-Napoca, Târgu Mureș Năsăud and managing interactions with research participants.

VI.4. New research directions

- The need to take into account several criteria, with complex, cross, convergent and complementary action. Certainly, from the point of view of research, this leads to the design of multi-factorial designs and to the construction of a complex statistical and mathematical apparatus for performing high accuracy analyzes.
- Extending the research to other university specializations, taking into account their specificity, the need to develop research tools in line with their fields of study.
- Extending the research to other age groups, professions, fields of activity, professional communities, etc., in the context of lifelong learning and in the most diverse socio-economic contexts.
- Extending the research to other types of resources, namely virtual and augmented resource resources, which in the future society will be part of the ordinary resources of digital citizens.
- Using heterogeneous samples from the point of view of biological genes and performing comparative analyzes between the two genres, highlighting the differentiating aspects.
- Providing virtual interactions between participants in order to form groups and learning communities and to support each other in managing information management.

References

Abel, D. C. (1992). Theories of human nature, New York, McGraw-Hill Education.

Addiss S. & Erickson M. (1993). Art History and Education, Illinois, University of Illinois Press.

Aharonya N., Pana W., Ip C., Khayal I., Pentland A., (2011). Social fMRI: Investigating and shaping social mechanisms in the real world, Pervasive and Mobile Computing 7, Issue 6, pp. 643–659, Elsevier. Retrieved from: https://doi.org/10.1016/j.pmcj.2011.09.004

Albulescu, I. (2015). Pedagogii alternative. Editura ALL, București.

Baciu, C., (2015). The evolution of educational means. A historical perspective în: Procedia - Social and Behavioral Sciences 180 (2015) 280 – 285, Elsevier. http://www.sciencedirect.com/science/article/pii/S1877042815014482

Baciu, C., Bocoş, M-D., Andronache, D., Bocoş, V. (2015). Instrument operationnel d'évaluation de la qualité intrinsèque des réssources éducationneles libres, la 6e Colloque International du Reseau International Francophone des Etablissements de Formation de Formateurs, Universitatea Patras, Grecia (http://colloque2015.rifeff.org/fr/papers/search)

Baciu, C., Bocoş, M-D., Baciu-Urzică, E.C., (2015). Metamodernism – A Conceptual Foundation, Procedia - Social and Behavioral Sciences, Volume 209, 3 December 2015, Pages 33-38. https://www.sciencedirect.com/science/article/pii/S187704281505573

Bakshi, K. (2016). Big data analytics approach for network core and edge applications. In 2016 IEEE Aerospace Conference (pp. 1–10). IEEE. https://doi.org/10.1109/AERO.2016.7500560

Balter, M. (2011). Cave paintings showed true colors of stone age horses, https://www.wired.com/2011/11/cave-painting-colors/

Banafa, A. (2016) The Internet of Everything (IoE) (https://www.bbvaopenmind.com/en/technology/digital-world/the-internet-of-everything-ioe/).

Beciu, C. (2001). Spaţiul Public în societatea informaţională. Impactul noilor tehnologii de comunicare in Societatea informaţională, societatea cunoaşterii – concepte şi strategii (coord. Filip, F.), Editura Expert, Bucureşti p. 165-177 / ISBN 973-8177- 42-1

Berger, G. (1973). Omul modern şi educaţia sa, Editura Didactică şi Pedagogică, Bucureşti

Berinato, S. (2014). With big data comes big responsibility. Harvard Business Review. Harvard Business School Publishing.

Berinde, A., (1979). Instruire programată, Editura Facla, Timişoara.

Bhat, A. Z., & Ahmed, I. (2016). Big data for institutional planning, decision support and academic excellence. In 2016 3rd MEC International Conference on Big Data and Smart City, ICBDSC 2016. https://doi.org/10.1109/ICBDSC.2016.7460353

Bignell, J. (2007). Postmodern Media Culture, Edinburgh University Press.

Blazquez, D., Domenech, J., (2018). Big Data sources and methods for social and economic analyses, în Technological Forecasting & Social Change 130 (2018) 99–113, Elsevier. http://dx.doi.org/10.1016/j.techfore.2017.07.027

Bocoş, M. & Chiş, V. (2013). Management curricular. Repere teoretice şi aplicative, Volumul I. Piteşti: Editura Paralela 45.

Bocoş, M. & Chiş, V. (2013). Management curricular. Repere teoretice şi aplicative, Volumul I., Editura Paralela 45, Piteşti.

Bocos, M-D., Jucan, D.A., (2007) Teoria şi Metodologia Instruirii. Teoria şi Metodologia Evaluarii, Casa Cărţii de Ştiinţă, Cluj-Napoca.

Bocoş, M-D. (2017). Didactica disciplinelor pedagogice. Un cadru constructivist, ediţia a IV-a revizuită, Editura Paralela 45, Piteşti.

Bocoş, M.-D. (coord.) (2017). Dicţionar praxiologic de pedagogie: I-L, Editura Paralela 45, Piteşti.

Bocoş, M.-D. (coord.) (2016). Dicţionar praxiologic de pedagogie: E-H, Editura Paralela 45, Piteşti.

Bocoş, M.-D. (coord.) (2016). Dicţionar praxiologic de pedagogie: A-D, Editura Paralela 45, Piteşti.

Bocoş, M.-D. et al. (2015). Tratat de management educaţional pentru învăţământul primar şi preşcolar, Editura Paralela 45, Piteşti.

Bocoş, M.-D. (2013). Instruirea interactivă. Repere axiologice şi metodologice, Editura Polirom, Iaşi.

Bocoş, M.-D. (2008). Teoria curiculum-ului. Elemente conceptuale şi metodologice. Editura Casa Cărţii de Ştiinţă, Cluj-Napoca.

Bocoş, M. (2007). Teoria şi practica cercetării pedagogice, Editura Casa Cărţii de Ştiinţă, Cluj-Napoca.

Boyd, D., & Crawford, K. (2011). Six Provocations for Big Data. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.1926431

Bran, N. (2009). The Cambridge Introduction to Postmodern Fiction, Cambridge University Press, Cambridge.

Butler, C. (2002). Postmodernism: A Very Short Introduction, Oxford University Press Oxford.

Cerghit, I. et al. (1990). Didactica, Editura Didactică şi Pedagogică, Bucureşti.

Chang, C. I., & Lo, C. C. (2016). Planning and Implementing a Smart City in Taiwan. IT Professional. https://doi.org/10.1109/MITP.2016.67

Chiș, V. & Albulescu, I. (2015). Proceedings of the International Conference on education, Reflection and Devlopment, Cambridge Scholars Publishing, London, UK.
Chiș, V. (2014). Fundamentele Pedagogiei. Repere tematice pentru studenți și profesori, Editura Eikon, Cluj-Napoca.
Chiș, V., Albulescu, I., Catalano, H., (2013). Dimensiuni ale educației și formării în școala contemporană. Ed. Eikno, Cluj-Napoca
Chiș, V.; Albulescu, I., (2010). Cercetări și aplicații în științele educației, Editura Casa Cărții de Știință, Cluj-Napoca.
Chiș, V. (2005). Pedagogia contemporană - pedagogia pentru competențe, Editura Casa Cărții de Știință, Cluj-Napoca.
Chiș, V. (2003). Provocările pedagogiei contemporane. Cluj-Napoca: Editura Presa Universitară Clujeană.
Christakis, N. A., & Fowler, J. H. (2010). Social network sensors for early detection of contagious outbreaks. PLoS ONE. https://doi.org/10.1371/journal.pone.0012948
Ciolan, L. (2008). Învățarea integrată. Fundamente pentru un curriculum transdisciplinar, Editura Polirom, Iaşi.
Courtland R. (2017). Intel Now Packs 100 Million Transistors in Each Square Millimeter. (https://spectrum.ieee.org/nanoclast/semiconductors/processors/intel-now-packs-100-million-transistors-in-each-square-millimeter).
Dave, R. H., (1991). Fundamentele educaţiei permanente, Editura Didactică şi Pedagogică, Bucureşti.
Davidson, M. W., Haim, D. A., & Radin, J. M. (2015). Using Networks to Combine "Big Data" and Traditional Surveillance to Improve Influenza Predictions. Scientific Reports, 5, 8154. Retrieved from http://dx.doi.org/10.1038/srep08154
DEX (2009) - Dicționarul explicativ al limbii române (editia a II-a, revăzută și adăugită), Academia Română, editura Univers Enciclopedic, București.
Distin, K. (2011). Cultural Evolution, Cambridge, Cambridge University Press.
Dobrescu, T., (2010). Instruire asistată de calculator.Universitatea Politehnică din Bucureşti. Centrul de Perfecţionare în Asigurarea Calităţii şi Certificarea Auditorilor (CPAC-CA). https://vdocuments.site/curs-iac-558c82e659734.html
Eady, M.J. & Lockyer, L. 2013, Tools for learning: technology and teaching strategies, Learning to Teach in the Primary School, Queensland University of Technology, Australia, p. 71.
Evans, D. (2012). The Internet of Everything. How More Relevant and Valuable Connections Will Change the World. (https://www.cisco.com/c/dam/global/en_my/assets/ciscoinnovate/pdfs/IoE.pdf).
Fabián, R. Z., (2004) Audiovisual Technologies In Education, Revista Digital Universitaria, Volumen 5 Número 10.
Fan, W., Bifet, A., (2012) Mining Big Data: Current Status, and Forecast to the Future, SIGKDD Explorations, Volume 14, Issue 2. Retrieved from: http://www.kdd.org/exploration_files/V14-02-01-Fan.pdf
Fourez, G. (1988). La construction des sciences, De Boeck Université, Bruxelles.
Friedrichs, G.; Schaff, A., (1985). Microelectronica și societatea la bine și la rău, Editura Politică, București.
Gandomi, A., & Haider, M. (2015). Beyond the hype: Big data concepts, methods, and analytics. International Journal of Information Management, 35(2), 137–144. https://doi.org/10.1016/j.ijinfomgt.2014.10.007
Geiling, N. (2014) Prehistoric Rock Art to Visit Around the World, Smithsonian Institution, https://www.smithsonianmag.com/travel/prehistoric-rock-art-visit-around-world-180952989/#yuHV7V7XbTHgbwIc.99
George, G., Haas, M., & Pentland, A. (2014). BIG DATA AND MANAGEMENT. Academy of Management Journal, 57(2), 321. https://doi.org/10.1111/risa.12287
Gerard George, Ernst C. Osinga, Dovev Lavie, & Brent A. Scott. (2016). Big Data and Data Science Methods for Management Research. Academy of Management Journal, 59(5), 1493–1507. https://doi.org/10.5465/amj.2016.4005
Glava, G., (2009) Formarea competențelor didactice prin intermediul e-learning. Modele teoretice și aplicative. Editura Casa Cărții de Știință, Cluj-Napoca.
Grau, C., Ginhoux, R., Riera, A., Nguyen, T. L., Chauvat, H., Berg, M., … Ruffini, G. (2014). Conscious Brain-to-Brain Communication in Humans Using Non-Invasive Technologies. PLoS ONE, 9(8), e105225. http://doi.org/10.1371/journal.pone.0105225
Hendry, M. & Page, J. (2013). Media, Technology and Imagination, Cambridge Scholars Publishing, Cambridge.
Hickman, L.A. (2007). Pragmatism as Post-Postmodernism, Fordham University Press, New York.
Iacob, L., (2004) Comunicarea în context educativ și didactic. Revista Didactica Pro..., Nr. 2(24), Republica Moldova. https://ibn.idsi.md/sites/default/files/imag_file/Comunicarea%20in%20contextul%20educativ%20si%20didactic.pdf
Iancu, Ș., (2009). Societatea cunoașterii necesită gândire, Cogito, Open Access Journal, volumul I, numărul 2., http://cogito.ucdc.ro/nr_2/16%20-%20Stefan%20Iancu%20-%20SOCIETATEA%20CUNOASTERII%20NECESITA%20GANDIRE.pdf

Ilica, A., Herlo, D., Binchiciu, V., Curetean, U.A.C., (2005). O pedagogie pentru învățământul primar. Conspecte psihopedagogice pentru examenul de definitivare şi gradul didactic II, ed. Universității „Aurel Vlaicu", Arad. http://www.aiarad.ro/pdf/proiecte/pedagogie.pdf

Ionescu, M. & Chiș, V. (2009). Fundamentări teoretice și abordări praxiologice în științele educației, Editura Eikon, Cluj-Napoca.

Ionescu, M. (2011). Instrucţie şi educaţie. Paradigme educaţionale moderne, ediţia a IV-a revizuită şi adăugită, Editura Eikon, Cluj-Napoca.

Ionescu, M. et al. (1997). Dezbateri de didactică aplicată, Editura Presa Universitară Clujeana, Cluj-Napoca.

Iucu, R.B, (2000). Managementul şi gestiunea clasei de elevi, Fundamente teoretico-metodologice, Editura Polirom, Iaşi.

Iucu, R.B., (2005). Formarea cadrelor didactice: sisteme, politici, strategii, Ed. Humanitas Educaţional, Bucureşti.

Joannes, A., (2009). Comunicarea prin imagini. Ed. Polirom, Bucureşti.

Kinshuk J. M., Khribi M.K, (2017) Open Education: from OERs to MOOCs, Springer-Verlag Berlin Heidelberg.

Komańda, M. (2016). Metamodernism and Social Sciences https://www.researchgate.net/publication/295075978_Metamodernism_and_Social_Sciences.

Komańda, M. (2013). Postmodern View of the Nature of the Internet as a Source of Information (December 3, 2013). Available at SSRN: https://ssrn.com/abstract=2462390 or http://dx.doi.org/10.2139/ssrn.2462390

Kramer, S.N. (2010) The Sumerians. Their history, culture, and caracter. The University of Chicago Press, London, UK.

Lazer, D., Kennedy, R., King, G., & Vespignani, A. (2014). The parable of google flu: Traps in big data analysis. Science. American Association for the Advancement of Science. https://doi.org/10.1126/science.1248506

Logan R. K. (2010) Understanding New Media: Extending Marshall McLuhan, Peter Lang Publishing, Inc., New York.

Lohr, S. (2012). The Age of Big Data. The New York Times, 1–5. https://doi.org/10.1126/science.1243089

Lopez, D., (2018). Top 6 Digital Transformation Trends in Education for 2018, http://blog.screenbeam.com/2018/01/17/6-digital-transformation-trends-edu/

Maguire, J., (2013). Mechanical Engineering: The Driveshaft of Humanity. https://dc.cod.edu/cgi/viewcontent.cgi?article=1458&context=essai.

Manea A.D & Stan, N.C., (2016). Online communication, in Chiș V. & Albulescu, I. (eds). The European Proceedings of Social & Behavioural Sciences. Vol. VIII, 2016/12/ 40 pp. 317-323.

Manea A.D. & Chiș, O., (2016). Assertiveness in the Didactic Communication, Journal of Romanian Literary Studeis, Issue no. 8. http://www.diacronia.ro/ro/indexing/details/A23147/pdf

Manea A.D. & Stan N.C, (2014). Reuşita şcolară – repere conceptuale şi praxiologice, vol. Impactul europenizării asupra didacticii şi cercetării în învăţământul superior, Cahul, pp.70- 73, 2014.

Manea A.D. (2015). Pragmatismul comunicării on-line, Journal of romanian literary studies, Nr. 6/2015, pp.227-230, Târgu-Mureş: Arhipeleag XXI Press.

Mani, A., Rahwan, I., & Pentland, A. (2013). Inducing Peer Pressure to Promote Cooperation. Scientific Reports, 3, 1735. Retrieved from http://dx.doi.org/10.1038/srep01735

Mansell R. & Wehn U. (1998). Knowledge Societies: Information Technology for Sustainable Development, Oxford, Oxford University Press.

Mashey, J., (2015). Big Data – Yesterday, Today and Tomorrow, Retrieved from: http://computer.ieeesiliconvalley.org/big-data-yesterday-today-and-tomorrow/

Mazzucato, M., (2018). Let's not forget that a large part of the technology and necessary data was created by all of us. MIT Technology Review, vol. 121, no.4, Jul/Aug

McAfee, A., & Brynjolfsson, E. (2012). Big data: the management revolution. Harvard Business Review, 90(10). https://doi.org/10.1007/s12599-013-0249-5

Mîrza, E., (2008). Educația culturologică a studenților în instituția de învățământ superior. Teză de doctorat. Chișinău, Republica Moldova. http://www.cnaa.acad.md/thesis/8674/

Neacșu, I., (1990). Instruire și învățare, Editura Științifică, București.

Nealon, J.T. (2012). Post-Postmodernism or the cultural logic of just in time capitalism, Stanford University Press, Stanford, California.

"Negruț, V., Arsith, M., (2013). „Proiectarea şi implementarea curriculumului centrat pe competenţe", Editura Delta Cart Educaţional. ISBN: 6066291793, 9786066291798

2013. https://issuu.com/luigi_ionescu/docs/curriculum_centrat_pe_competente"

Noam, C. & James A. M. (2012)Chomsky, N., & McGilvray, J. (2012). The Science of Language: Interviews with James McGilvray. Cambridge: Cambridge University Press. doi:10.1017/CBO9781139061018, Cambridge, Cambridge University Press

Noam, C., (2017). https://www.youtube.com/watch?v=772WncdxCSw

Noam, C., James, A. M. (2012). The Science of Language – Interviews with James McGilvray, Cambridge, Cambridge University Press.

Odobleja, Ş. (1983). Cybernétique générale: psychologie consonantiste: science des sciences, Montreal, Pelham, Editions Nagard.
Pentland, A. (2014). The death of individuality: What really governs your actions? New Scientist, 222(2963), 30–31. https://doi.org/10.1016/S0262-4079(14)60684-9
Pentland, A., (2012). Reinventing Society in the wake of Big Data https://www.edge.org/conversation/alex_sandy_pentland-reinventing-society-in-the-wake-of-big-data
Preston, P. (2001). Reshaping Communications Technology. Information and Social Change, Sage Publications, 2001.
Radu, I., Iluț, P., Matei, L., (1994). Psihologie socială, edit. EXE, Cluj-Napoca.
Răduţ-Taciu, R., Stan, C., Bocoş, M.-D. (2017). Pedagogia adulţilor. Definiţii, elemente de reflecţie şi exerciţii aplicative, Editura Cartea Românească Educaţional, Piteşti.
Recommandation du Parlament européen et du Conseil du 18 décembre 2006 sur les compétences clés pour l'éducation et la formation tout au long de la vie (2006/962/CE), in Journal officiel de L'Union Européenne, 30.12.2006, L 394/10-18.
Regli, C.W., (2017). Building DARPA's Brain, IEEE Intelligent Systems, Volume: 32, Issue: 4, Published by the IEEE Computer Society. https://doi.org/10.1109/MIS.2017.3121558
Reynolds, B., (2014). Performance Studies: Key Words, Concepts and Theories. Palgrave Macmillan, London.
Riordan, M., (2004). The Lost History of the Transistor - https://spectrum.ieee.org/tech-history/silicon-revolution/the-lost-history-of-the-transistor
Robinson, A. (2009). Writing and Script: A Very Short Introduction, Oxford, Oxford University Press.
Singh, V. K., Mani, A., & Pentland, A. (2015). Social persuasion in online and physical networks. Proceedings of the IEEE, 102(12), 1903–1910. https://doi.org/10.1109/JPROC.2014.2363986
Socha & Eber-Schimd (2018). „What is New Media?", New Media Institute https://www.newmedia.org/what-is-new-media
Stan, C., (2010).Perspective teoretic-aplicative în abordarea obstacolelor din comunicarea didactică, Ed. Eikon, Cluj-Napoca.
Stan, N.C. & Manea, A.D. (2014). Students' opinions regarding the qualities and skills of the teachers, in Procedia -Social and Behavioral Sciences, vol. 128 /2014.pp 146 – 151
Stan, N.C., (2010). Pedagogia comunicării didactice. Suport de curs. https://www.slideshare.net/Ra_monell/pedagogia-comunicarii, https://vdocuments.mx/documents/pedagogiacomunicarii.html, https://www.scribd.com/document/40735876/Pedagogia-comunicarii
Stan, N.C., (2002). Originile educaţiei: antichitatea şi creştinismul timpuriu. Presa Universitară Clujeană
Stan, N.C., (2001). Teoria Educației. Actualitate și perspective. Presa Universitară Clujeană
Stan, N.C. (1996). Implications of postmodernism in education, Revista Studia, seria Psychologia-Paedagogia, nr. 1-2.
Ştefan, I., (2009). Societatea cunoaşterii necesită gândire, în Cogito Open Access Journal, Volumul 1, Issue 2.
Ştefan, I., (1997). Ciclul de articole „Societatea informaţională – un nou mod de a trăi şi a munci", în revista „Tribuna Economica", nr.8/1997.
Toffler, A. (1983). Al treilea val, Bucureşti: Editura Politică
Tweney, D. (2010). Dec. 9, 1968: The Mother of All Demo, https://www.wired.com/2010/12/1209computer-mouse-mother-of-all-demos/
UNESCO (2005). Towards knowledge societies, United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Report. Paris, France: UNESCO Publishing
Văideanu, G. et al., (1971). Educație Intelectuală, Editura Didactică și Pedagogică, Bucureşti.
Vermeulen, T. & Akker, R. (2010). Notes on metamodernism, Journal of Aesthetics & Culture, 2:1, DOI: 10.3402/jac.v2i0.5677
Wang, Y., Kung, L., Byrd, T.A. (2018), Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations, în Technological Forecasting & Social Change 126, 3–13, Elsevier. http://dx.doi.org/10.1016/j.techfore.2015.12.019
Wiener, N. (1961). Cybernetics or Control and Communication in the Animal and the Machine, MIT Press.
Winkler & Dauber (2014). Visual Propaganda and Extremism in Online Environment, The United States Army War College, Srategic Studies Institute.
Zamudio, F.R. (2004) Audiovisual Technologies In Education, Revista Digital Universitaria, Vol. 5/ 10, 10 .XI. 2004
Zavarzadeh, M., (1975). The Apocalyptic Fact and the Eclipse of Fiction in Recent American Prose Narratives". Journal of American Studies, Vol. 9, no. 1, pp. 69-83 (Apr. 1975).
Zwitter, A. (2014). Big Data ethics. Big Data & Society, 1(2), 205395171455925. https://doi.org/10.1177/2053951714559253

Online resources

Comisia Europeană, (2018). A Digital Agenda for Europe. https://eur-lex.europa.eu/legal-content/RO/TXT/HTML/?uri=CELEX:52010DC0245R(01)&from=EN

DARPA (2018). Information Processing Techniques Office https://www.darpa.mil/about-us/timeline/ipto

DARPA (2018). ARPANET https://www.darpa.mil/about-us/timeline/arpanet

DARPA (2018). First Computer Mouse https://www.darpa.mil/about-us/timeline/mouse

DARPA (2018). Mother of all Demos https://www.darpa.mil/about-us/timeline/the-mother-of-all-demos

DARPA (2018). oN-Line System https://www.darpa.mil/about-us/timeline/nls

European Commission, Directorate General for Education and Culture, Basic Indicators on the Incorporation of ICT into European Education Systems. Facts and figures, 2000/01, Annual Report, https://publications.europa.eu/en/publication-detail/-/publication/1233cc01-e3d6-4d32-a48d-84c49630cbb6/language-en

Eurydice, 2011. http://eacea.ec.europa.eu/education/eurydice/documents/key_data_series/129RO.pdf

Gartner Reveals Top Predictions for IT Organizations and Users in 2018 and Beyond (2017). https://www.gartner.com/newsroom/id/3811367

http://colloque2015.rifeff.org/fr/papers/search

http://consultation.australiancurriculum.edu.au/Static/docs/Technologies/Draft%20Australian%20Curriculum%20Technologies%20-%20February%202013.pdf

http://dictionary.cambridge.org/dictionary/british/meta

http://eacea.ec.europa.eu/education/eurydice/documents/key_data_series/129RO.pdf

http://ec.europa.eu/social/BlobServlet?docId=15688&langId=en

http://issuu.com/apti.ro/docs/brosuracc0v72web/7?e=9876291/5708346

http://plato.stanford.edu/entries/postmodernism/

http://www.aestheticsandculture.net/index.php/jac/article/view/5677/6304

http://www.britannica.com/topic/postmodernism-philosophy

http://www.dataprotection.ro/?page=Protectia_datelor_personale_si_site-urile_de_relationare_sociala&lang=ro

http://www.huffingtonpost.com/seth-abramson/the-metamodernist-manifes_2_b_5678854.html

http://www.merriam-webster.com/dictionary/cybernetics

http://www.oxforddictionaries.com/definition/english/Internet

http://www.oxforddictionaries.com/definition/english/postmodernism

http://www.parlament.md/LegislationDocument.aspx?Id=194c8971-9f17-4311-a15d-dd579d788553

http://www.research.gov.ro/ro/articol/4044/programe-interna-ionale-programul-cadru-orizont-2020-excelen-a-tiin-ifica-tehnologii-viitoare-si-emergente

http://www.tribunainvatamantului.ro/informatizarea-educatiei/.

http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-are-open-educational-resources-oers/

http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-are-open-educational-resources-oers/

http://www.wikipedia.com

https://archive.org/stream/Alvin_Toffler-Al_Treilea_Val_1_1_10__/Alvin_Toffler-Al_Treilea_Val_1_1_10___djvu.txt

https://books.google.ro/books?id=NuG-pvgnd6IC&lpg=PP1&dq=El%20arte%20rupestre%20de%20Argentina%20ind%C3%ADgena%3A%20Patagonia&pg=PP1#v=onepage&q=El%20arte%20rupestre%20de%20Argentina%20ind%C3%ADgena:%20Patagonia&f=false

https://books.google.ro/books?id=-TR-bL4yOQcC&lpg=PP1&pg=PP1#v=onepage&q=rupe&f=false

https://dexonline.ro/definitie/altamira/519016

https://en.wikipedia.org/wiki/Future_and_Emerging_Technologies

https://en.wikipedia.org/wiki/Prosthesis

https://pages.gseis.ucla.edu/faculty/kellner/essays/postmodernturnch4.pdf

https://ro.wikipedia.org/wiki/Pictur%C4%83_rupestr%C4%83

https://ro.wikipedia.org/wiki/Revolu%C8%9Bia_industrial%C4%83

https://www.cla.purdue.edu/english/theory/postmodernism/modules/introduction.html

https://www.class-central.com/report/mooc-stats-2017/

https://www.sciencedirect.com/science/article/abs/pii/S0019850117302730

https://www.youtube.com/watch?v=IxQ7QcFaHUg

Integrarea Digitală. Ghid pentru ţările în curs de dezvoltare. Information Technologies Group, Center for International Development at Harvard University. Cu susţinerea: International Business Machines Corporation. https://cyber.harvard.edu/readinessguide/Readiness-translation%20Romanian.doc

SRI's "Mother of All Demos", Dec. 9, 1968: Collaboration https://www.youtube.com/watch?v=9QX6dD7YFo4