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THE EFFECTIVE TRIAD: IMPACT, DIGITAL CONTENT AND ADULT EDUCATION. A CASE STUDY APPROACH

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Abstract: *Lifelong learning, continuous learning, accessibility and quality of education and training systems in Europe play a decisive role in attaining the development of knowledge-based society. The paradigm of e-learning is expansively growing in adult education. The purpose of this paper is to assess the impact of e-learning and digital technologies in adult education. To achieve this goal a research study was conducted. The study proposed in this paper aims to point out the answers to the following questions: Does the digital content bring significant changes in adult learners? Is this type of educational content valuable for adult training? What are the contexts and conditions to produce effective learning by using digital content and technologies? The paper consists of four parts. The introduction is focused on the state of the art regarding e-learning, digital technologies and adult education. The second section describes the research design: research problem and questions, research goal and hypotheses, research methodology, research instruments and data analysis procedures. Furthermore, the third section discusses the research results. The fourth part reveals the conclusions of the study.*

Keywords: *adult learning, digital educational content, impact assessment*

1. INTRODUCTION AND CONTEXT

The European society crosses a period of profound social, economic and educational changes, whose main goal is the transformation into the most competitive and dynamic knowledge-based economy worldwide [3, 5].

Knowledge and innovation are its most important strengths comparing to other economies. Lifelong learning, continuous learning, accessibility and quality of education and training systems in Europe play a decisive role in attaining the development of knowledge-based society. The process of lifelong learning requires the ability to follow, continue learning and to organize one's own learning process. The key competences such as

linguistic skills, mathematical abilities and digital technologies' (ICT) use are necessary to acquire processes and assimilate new knowledge and skills. European citizens are facing new barriers: linguistic and multicultural skills are becoming increasingly important on the European labor market and in European societies developed on a wide variety of traditions and cultures. New technologies change work processes requiring additional skills, stimulating the advance of knowledge-based economy [3]. The complexity of work responsibilities generates the need for updating and restructuring professional or technical competences, but also cross competences, so-called life skills.

In this context, adult education is an element of support and necessity for professionals who need to integrate and to practice efficiently in different professional and organizational environments. From the perspective of learning organizations, the investment in people is one of the effective ways of increasing the productivity, competitiveness and efficiency of the employees. Trilling and Fadel [5] reinforce this thesis by arguing the 21st century brought remarkable changes to professional environments. As the authors note, there are four powerful forces leading instructional designers to create new learning contexts, namely knowledge work, thinking tools, digital lifestyles and learning research. These four forces act in a double direction: they create the need and supply the tools and learning contexts to support new ways of producing learning. E-learning expresses best tools, environments and opportunities to respond to the professional needs.

The paradigm of e-learning is expansively growing in adult education. However, the lack of clear and reliable evaluations limits the appropriate use of this innovative approach [4]. The answers the scholars have to formulate are not only related to the cost-effectiveness of e-learning.

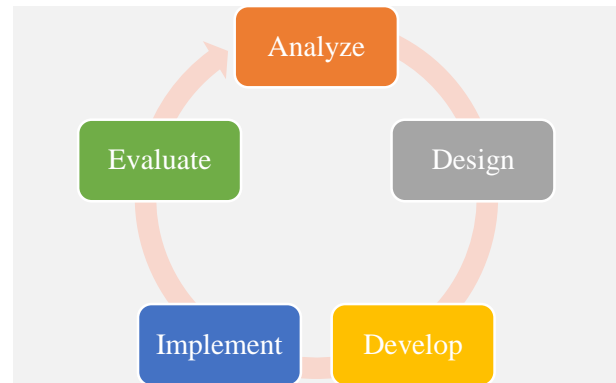
The study proposed in this paper aims to point out clearly the answers to the following questions: Is e-learning effective? For what groups of learners? How do different learners respond?

Thus, the study translates in concrete results the impact of e-learning, namely digital educational content hosted by a learning management system (LMS) in adults' training. To support and clarify the research goal and methodology, the paper states the following definition of impact in the field of adult training: *the measurable results arising from the existence of an e-learning strategy that demonstrate a change in the learning activity for which the resource is intended*. In addition, the term ICT or digital technologies refer to a collection of computer-based technologies to support teaching and learning, communication and collaboration [1].

In order to assess the impact of e-learning in adult education, a research study was conducted. The context supporting this study

refers to a number of public employees using a LMS and digital educational content (multimedia resources) to train their selves. The content was designed by following the phases and processes stated by the ADDIE (Analyze, Design, Develop, Implement, Evaluate) instructional design model [1]. Fig. 1 presents the chain processes of the mentioned model.

Fig. 1 ADDIE model



The following section describes the research methodology and focuses on training sessions.

2. DESIGN OF THE STUDY

2.1 Research problem and questions. The design of this research study was guided by the need of answering two main questions:

A. Does the digital content change something in adults' learning activity?

B. Is this type of educational content valuable for adult training?

In other words, the study will answer the question: *Which is the impact of digital content in adult learning activity?*

The research problem gathers two important aspects, operationalized as research variables: digital content, on one hand, and impact, on the other hand. As argued before, the impact is operationalized through a set of indicators measured during the implementation of the research project.

2.2 Research goal and hypotheses. The goal of this research is to investigate the impact of digital content on adult learning activity, focusing on motivation, performance, attitudes, and interests.

To achieve this goal, objectives and targets are linked to this goal. The usefulness of specific objectives is to guide, at a practical level, the research implementation. In the context of the



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study, the following general hypothesis (Hg) can be formulated:

Hg: Use of the digital educational content in the training process leads to a higher degree of efficiency in training. Research hypotheses operationalize Hg by referring dependent variables, namely motivation, performance, attitudes, interests, and learning outcomes, in relation to the digital content.

2.3 Research methodology. The research sample included 242 professionals working in the public sector participating in a training program based on the use of learning management system and educational digital content. The sampling design followed a theoretical and realistic approach based on the criterion of relevance [2]. All the public servants were purposefully selected based on their job's profile.

Fig. 1 and Fig. 2 describe subjects' gender and age distribution. Most of the investigated subjects are females, with a relative balanced age distribution.

Fig. 2 Subjects' gender distribution ($N = 242$)

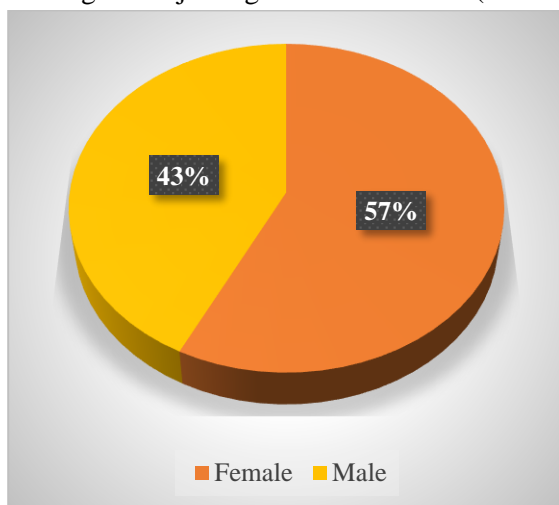
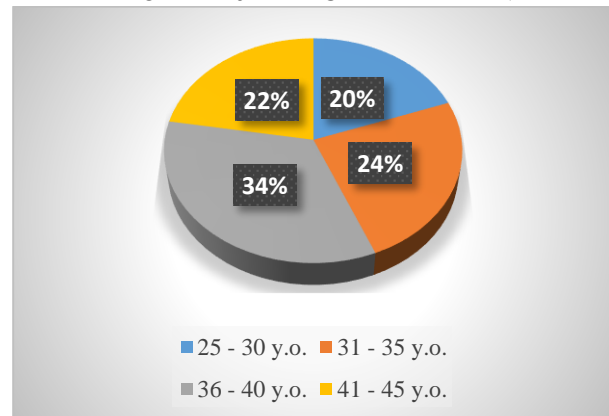


Fig. 3 Subjects' age distribution ($N = 242$)



Data collection procedures. The study followed a correlational design implemented in three phases: a) phase 1 consisted in profiling the participants; b) phase 2 refers to training's delivery; c) after the training session, the participants were re-tested. In the following, we briefly describe the three phases of the project.

The profiling phase consisted in applying different instruments to assess knowledge, motivation, attitudes and interests on learning, and expected outcomes. Before entering the formation program, the participants were tested to identify their level of ICT skills. All the subjects benefited of a training session regarding the use and features of the LMS. Thus, it can be assumed that participants had a comparable level of LMS usage skills. The participants completed a self-administrated knowledge test regarding their technical competencies. Learning, motivation, attitudes and interests were assessed by using dedicated questionnaires and interview protocols. The collected data was an input to design the digital educational content.

The second phase focused on training delivery. The training comprised both asynchronous and synchronous instruction strategies [1]. The total duration of the training was 120 hours of instructional time, from which

40 were dedicated to synchronous learning. The participants benefited of a virtual classroom LMS module, where an instructor guided them to solve general and specific tasks, where they could ask questions and discuss the previous topics.

The training goal was to improve both cross and technical competences. This goal was refined after conducting the needs analysis [6] as the first part of the ADDIE instructional design model. The needs analysis process revealed the participants were willing to improve their ICT skills (such as using text processors, data mining tools, internet searching), but also communication and negotiation skills. Communication in foreign languages represented a significant needs area. Regarding technical skills, the participants attended courses on quality management, financial management, European funds, performance management and project management. According to their level of information on these topics, the participants followed the modules either for beginners or for advanced learners.

The courses addressing cross competences proposed the same level of difficulty for all the participants, excepting the foreign language courses (designed based on the European language framework).

During training sessions, the participants were able to share with their fellows by using the forum module or with their instructor by accessing the email or chat services. To facilitate self-paced learning, the training courses by the following structure. A course comprises several learning sessions. One learning session equals an hour of learning time divided into learning objects (LO) with a duration of 5-15 minutes each.

The training covered 8 months. Traffic reports revealed that participants were logged in for at least 2 to 3 hours per week.

After conducting the training, the subjects were re-tested in order to evaluate the impact of the program. A hybrid research methodology, blending traditional quantitative and qualitative research methods (questionnaires and interviews) was preferred to support the correlational design.

2.4. Research instruments. Many different methods and tools can assess the impact of

digital technologies on adult learning. As argued before, learning motivation, attitudes, interests and performance operationalized the impact of ICT. A qualitative and quantitative mix of research methods and tools instrumented both testing moments (before and after the training program).

Firstly, knowledge tests were applied through the LMS platform. To understand better motivation, attitudes and interests on learning, two research instruments were designed: the LIMA questionnaire and an in-depth interview protocol. LIMA questionnaire comprised two scales [7], namely motivation scale (MS) and attitudes scale (AS). The MS scale [7] focused on both intrinsic and extrinsic motivation, comprising items guided by previous qualitative research [7]. The AS scale encompasses other five subscales: enjoyment of learning, self-confidence, control of the learning process, self-concept as a cognitive subject and relevance of learning. The 50 items of LIMA questionnaire were Likert rated, having a good internal consistency of each scale (MS *Chronbach's alpha* = .89, AS *Chronbach's alpha* = .87).

The in-depth interviews aimed to explore deeper the participants' opinions on learning motivation and attitudes. The interviews were conducted after applying the knowledge tests and LIMA questionnaire.

After the training program delivery, the participants were re-tested by using the same instruments. In addition, the interview protocol included a section dedicated to learning the experience in digital environments.

2.5. Data analysis procedures. To analyze narrative data collected through in-depth interviews, content analysis was performed. Content analysis supposed a systematic coding operation.

Statistical analyses were conducted to analyze quantitative data. The psychographic segmentation (based on K-Means cluster analysis and factorial analysis) reveals three segments of learners, according to their learning motivation and attitudes: a) the Hunters; b) the Lurkers and c) the Hobbyists (**Error! Reference source not found.**

The Hunters have low intrinsic motivation, looking to achieve future career aspirations, to gain qualifications or to satisfy employer's



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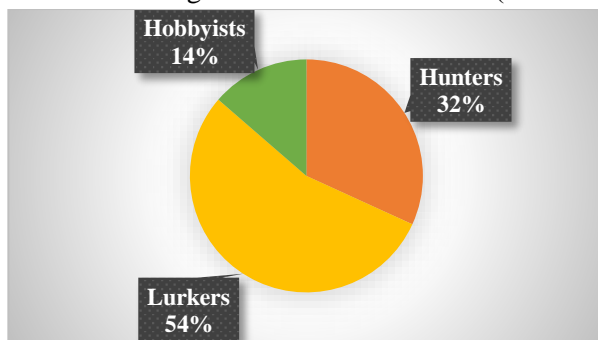


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requirements. Financial support or incentives are a powerful method to motivate Hunter employees.

Fig. 4 Clusters' distribution ($N = 242$)



The Lurkers are extremely low motivated to improve their personal or professional skills. If needed, they will involve in a training program just to earn some instant gratification (such as promotions or bonuses). The Hobbyists are intrinsic motivated, willing to participate in training programs in order to share with their fellows, to develop technical capacities or become more competitive. In addition, the Hobbyist think financial incentives are an appropriate way to acknowledge their personal efforts.

The following section of the paper discusses other clusters' characteristics.

3. DISCUSSIONS OF THE RESEARCH RESULTS

The frequency analysis revealed that an impressive majority of subjects (96%) low motivated to learn and increase professional capabilities. Depicting the composite score of learning motivation showed relevant differences among the structural elements of motivation. Table 1 synthesizes values of statistical indicators relevant in conducting a diagnosis of subjects' level of learning

motivation. The means calculated for all the structural elements of learning motivation indicate a gap between intrinsic and extrinsic motivation. There is a statistically significant difference between them, $p = .002$. The subjects respond better to financial or material rewards than they do to personal gain, which is not a productive behavior for learning efficiency.

Table 1 Learning motivation before training ($N=242$)

Learning motivation	Mean	St. dev.	Min.	Max.
Learning motivation	2.57	.27	1.75	3.25
To achieve future career aspirations	3.49	1.13	2.00	5.00
To gain qualifications	3.45	1.14	2.00	5.00
For personal development	1.96	0.82	1.00	3.00
To develop skills, experience and knowledge	2.58	1.11	1.00	4.00
By receiving professional support, information, advice and guidance	2.05	0.85	1.00	3.00
By receiving support from peers	2.01	0.80	1.00	3.00
By a style of learning or learning environment	2.00	0.80	1.00	3.00
For entertainment and interest	1.93	0.79	1.00	3.00
As an employer requirement	2.93	1.38	1.00	5.00
As a productive use of time	2.06	0.81	1.00	3.00
By financial support and incentives	3.99	0.81	3.00	5.00
To widen options and increase opportunities	2.48	1.12	1.00	4.00

Learning attitudes are consistent with subjects' low learning motivation (Table 2).

Table 2 Learning attitudes before training ($N=242$)

Learning attitudes	Mean	St. dev.	Min.	Max.
Enjoyment of learning	3.32	0.76	1.50	5.00
Self-confidence	3.27	0.77	1.50	5.00
Control of the learning process	3.25	0.82	1.67	5.00
Self-concept as a cognitive subject	3.19	0.73	1.33	4.83
Relevance of learning	3.17	0.84	1.33	5.00

The means calculated for all the five subscales regarding learning attitudes indicate a

relatively positive attitude, but not strong, enough to support self-regulated and effective learning.

Consistent with quantitative data gathered through LIMA questionnaire, qualitative data point out relevant behaviors to sustain the need to change the strategy in adult learning. As argued in a previous section, the three psychographic segments of teachers, Eraser teachers, Wood teachers and Sharp teachers, will guide the discussion of the empirical results.

Learning attitudes and motivation vary among the three psychographic segments.

The Hunters do not have a clear career path, and they are always looking for better opportunities. They agree to learn is relevant if it increases the opportunities for promotion or other types of career advantages. The Hunters are young professionals, aged 25-35, both females and males. They do not enjoy learning but have a well-defined self-concept as cognitive subjects. In their opinion, learning is relevant if widens options, increases opportunities or is an employer's requirement. In addition, the Hunters focus on improving their qualifications' portfolio. Otherwise, they do believe adults can learn and adapt to new employment contexts.

Unlike Hunters, Lurkers are low motivated persons, who do not believe adults are able to learn. Learning is not a specific activity for mature professionals as they identify their selves. Thus, Lurkers have a negative perception on their selves as cognitive subjects. Most, they feel learning is a requirement, a will of the employer and they cannot control this process. Financial gains and material incentives act as strong extrinsic motives to support learning. Comparing to other two segments of subjects, the Lurkers hardly initiate the learning process as an intrinsic need. Unlike Hunters, Lurkers have a clear career path, feeling they do not need to change anything or to look for greater opportunities. The Lurkers are mature professionals, aged 35-45 (most of them are 40-45 years old), mostly females. In the context of the study, it was expected this category would show the greatest resistance in adopting the digital technologies in training.

The Hobbyists are the smallest segment in the investigated sample. They perceive learning

and training as an intrinsic need, in order to increase personal and professional capabilities. The Hobbyists are highly self-confident. They affirm learning and training are powerful tools to become more competitive in the work field. However, learning is not an organizational need only, but an individual one. This category of subjects manifests interest in learning for personal development too. In their opinion, collaborative learning is as useful as individual learning. Hobbyists are intrinsic motivated; their training activity non-related to job requirements sustains this fact. Outside of the work environment, most of the Hobbyist attended at least one course for personal development in the last three years. The Hobbyists are mostly young males, aged 25-35.

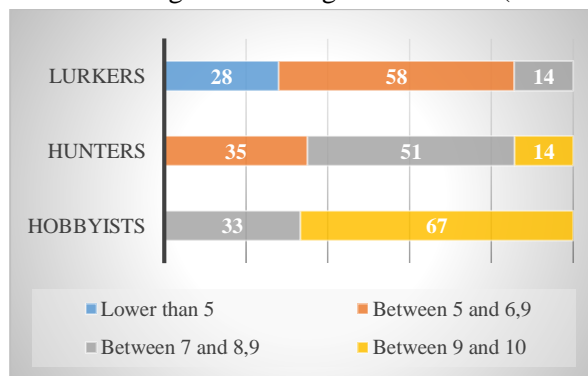
The results in the knowledge tests are consistent with the data collected through the LIMA questionnaire and interviews. Fig. 5 and Fig. 6 describe subjects' results according to their results on knowledge tests.

Fig. 5 Subjects' distribution according to knowledge tests results ($N = 242$)



The most of the respondents (70%) have average performance on knowledge tests. They obtained grades between 5 and 8.9.

Fig. 6 Psychographic segments distribution according to knowledge tests results ($N = 242$)





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As expected, The Lurkers are the subjects with the lowest performance. Most of them (58%) have grades between 5 and 6,9.

The Hobbyists and the Hunters have good performance: 67% of Hobbyist are between 9 and 10 while 14% of Hunters obtained the same performance.

The training program addressed both technical and transversal competences. At the end of the program, subjects were re-tested. Statistical analysis reveals there a significant difference between the two measured moments. Table 3 and Table 4 present the values of learning motivation and attitudes variables after the training program.

The training program improved participants' learning motivation ($Mean\ 2 > Mean\ 1$). Unlike the variables regarding the extrinsic motivation for learning, statistical analysis flag significant differences between the components referring to intrinsic motivation.

Table 3 Learning motivation after the training ($N = 242$)

Learning motivation	Mean 2	St. dev.	Min.	Max.
Learning motivation	3.20	0.36	3.20	0.36
To achieve future career aspirations	3.93	0.84	3.93	0.84
To gain qualifications	3.51	1.09	3.51	1.09
For personal development	2.95	1.41	2.95	1.41
To develop skills, experience and knowledge	3.50	1.07	3.50	1.07
By receiving professional support, information, advice and guidance	2.99	1.43	2.99	1.43
By receiving support from peers	2.98	1.43	2.98	1.43
By a style of learning or learning environment	2.57	1.16	2.57	1.16
For entertainment and interest	3.07	1.35	3.07	1.35
As an employer requirement	3.01	1.42	3.01	1.42
As a productive use of time	3.12	1.35	3.12	1.35
By financial support and incentives	4.06	0.82	4.06	0.82
To widen options and increase opportunities	2.67	1.30	2.67	1.30

For instance, before the training program, learning for personal development was not an important motive to support learning ($Mean1 = 1.96$). The training program changed participants perceptions in a positive direction, and they declared that they could improve their personal capabilities by learning ($Mean2 = 2.95$; $Mean2 > Mean1$, $p = .000$). Other improvements point the entertainment and interest as motives for learning. Before the training, most of the subjects did not agree that learning in adult age could be enjoyable ($Mean1 = 1.93$). By using digital technologies and appropriate digital educational content, they changed their opinions ($Mean2 = 3.07$, $p = .000$). The t -test is significant for the pair learning motivation before and learning motivation after the training ($t = 22.153$, $p = .000$). Expressing the results of the study in terms of the size effect, confirms the hypothesis that ICT has a positive impact on adult learners motivation. Cohen's d value ($d = 2.09$) indicates that the training program had a very large effect on participants' learning motivation. Lurkers and Hunters are the subjects who improved best their learning motivation. In addition, the use of ICT had a positive impact on attitudes on learning. All the means calculated for the five subscales of learning attitudes are greater than those before starting the program are. Self-confidence raised after using digital technologies for learning ($Mean2 = 4.42$, $Mean1 < Mean2$).

Table 4 Learning attitudes after the training program ($N = 242$)

Learning attitudes	Mean	St. dev.	Min.	Max.
Enjoyment of learning	4.31	0.50	2.27	5.00
Self-confidence	4.42	0.45	3.17	5.00
Controlling the learning process	4.35	0.40	3.32	5.00
Self-concept as a cognitive subject	4.39	0.47	3.17	5.00
Relevance of learning	4.36	0.53	2.27	5.00

Great changes of the self-confidence variable were measured especially for Lurkers, the category of subjects characterized by the lowest values of this indicator.

The *t*-test is significant ($p = .000$) for all the five pairs referring to the scale of attitudes on learning. Table 5 summarizes the size effect of the training program on learning attitudes.

Table 5 Size effect indicators

Pairs	<i>t</i> - test	Cohen's <i>d</i>	Size effect
Pair 1 Enjoyment of learning	21.433	1.54	Large
Pair 2 Self-confidence	25.557	1.84	Large
Pair 3 Control of the learning process	22.294	1.64	Large
Pair 4 Self-concept as a cognitive subject	23.294	2.67	Large
Pair 5 Relevance of learning	22.000	1.72	Large

As argued in the first section of this paper, the impact encompasses also the learning performance (learning results). If before the training program most of the participants registered average performances, the training program best improved Lurkers and Hunters' technical performances. The Hobbyists scored better in courses addressing cross competences.

4. CONCLUSIONS

The research confirmed the general hypothesis (H_g) that the use of ICT in adult learning has a positive impact. The results are visible for all the psychographic segments we were able to identify, namely Lurkers, Hunters and Hobbyists. However, to give an answer to the research question asking on whom ICT has a greater impact, it is possible to conclude that Lurkers and Hunters had the most visible changes in their learning behavior. They increased intrinsic motivation for learning, discovering that learning is enjoyable and can be more effective in collaborative contexts. The fact the training program blended both asynchronous and synchronous learning sustained the development of self-confidence and self-perception as a learner. At the beginning, the Lurkers expressed that they are not able to learn and their work environment is not so demanding. However, the training

altered their perceptions in a positive way. Lurkers and Hunters discovered ICT supports them to ask questions and receive a piece of advice without being uncomfortable in such a situation. For the Hobbyist, the training was an opportunity to change their perceptions on the work environment. Pre-test results revealed the Hobbyist believe the work environment was not so learning supporting. Collaborative tools offered the contexts to share with their fellows and discuss issues and options. In this way, new opportunities were created.

To conclude this research results, the digital technologies have the potential to support adult learning, but further research is needed.

REFERENCES

1. Adăscăliței, A.. *Instruire asistată de calculator. Didactica informatică*. Iași : Polirom (2007).
2. Emmel, N.. *Sampling and Choosing Cases in Qualitative Research. A Realist Approach*. London: Sage Publications (2013).
3. European Commission - Eurydice. *Key Data on Learning on Innovation through ICT at school in Europe 2011*. Bruxelles (2011).
4. Leinenbach, J.. *E-learning Management*. Iași: Polirom (2007).
5. Trilling , B., Fadel, C.. *21st Century Skills. Learning for Life in Our Time*. San Francisco: Joessy-Bass A Wiley Imprint (2009).
6. Vaughn, R. H.. *Manualul trainerului profesionist. Planificarea, livrarea și evaluarea programelor de instruire*. București: CODECS (2008).
7. Department for Business, Innovation and Skills. Motivation and barriers to learning for young people not Education, Employment or Training. *www.gov.uk*. [online]. Available: <https://www.gov.uk/government/publications/motivation-and-barriers-to-learning-for-young-people-not-in-education-employment-or-training> (February 2013).