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An Innovative Model for Science Teachers' Continuous Professional Development based on Exploiting Multimedia and Web 2.0 Applications in Education

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Abstract

The rapid development of technology allows the introduction of new modes of transmission, processing and storage of information in educational practice, along with the development of new communication and socialization techniques. In view to make known some new opportunities of the information society, but also being useful for teachers, this paper proposes an innovative model for teachers' continuous professional development – being particularly dedicated to teachers who act in the area of Mathematics and Natural Sciences. This model was tested and applied to a target group consisting of 1500 beneficiaries, in the frame of the project entitled: "ProWeb - A Network for Teachers' Continuous Professional Development in order to Use Multimedia, Virtual Instrumentation and Web 2.0 in the Curricular Area of Mathematics and Natural Sciences" (POSDRU/157/1.3/S/141587). As result, participant teachers acquired new skills in integrating Web 2.0 applications (blogs, wikis, content distribution, social networks etc.) and multimedia educational software in effective learning tools, designed and developed by them in the format of demonstration lessons. The paper presents also the particularities of the continuous professional development program, developed in a blended learning system, pointing out on its original elements, starting with the e-learning platform that supported the whole training process, and ending with the evaluation and certification aspects. More, for assessing the effectiveness of the

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training process, the paper includes relevant data, obtained through an investigative impact study, performed on the target group.

Keywords: teachers' continuous professional development, blended learning, multimedia, web 2.0, impact study, ProWeb project.

1. Introduction

The modern technologies change the way people work and communicate between them and from the educational point of view it is extremely important to pass from the traditional didactics, focused on the teacher, to the modern didactics. The advantage of new technologies is major, the process of teaching-learning-evaluation becoming attractive for the students [1].

Generally, the e-learning concept offers a convenient and an efficient access to new information, new and efficient methods of learning, evaluation of the knowledge [2]. But the larger usage of *New Technologies* in all the areas, especially by the young people, is carrying out a serious pressure on the academic staff and teachers. Practically, they are forced with stringency to adopt a new culture of learning, including pedagogical practices according to those realities, but also to elaborate new instruments and resources of learning, which can make appeal to wide accessible informational technologies and services. The new culture of learning has to encourage creativity, innovation and active engagement for the students and for the teachers [3].

In this respect, related projects on continuous professional development of teachers can ensure the abatement of the disparity which has been detected in the adaptation of the pedagogical practice with the evolution of the ICTs available for didactic demarches. At the same time, the activities organized till now and their results confirm once again the exceptional potential of the *Learning 2.0* paradigm, for cutting-edge scientific issues, pedagogy and institutional development of the school.

2. Methodology

The paper points out on rating the science teachers' satisfaction (as trainees) regarding the available resources for learning, as they were developed in the frame of the project entitled: "*ProWeb - A Network for Teachers' Continuous Professional Development in order to Use Multimedia, Virtual Instrumentation and Web 2.0 in the Curricular Area of Mathematics and Natural*

Sciences". In the CPD model proposed by the project, each trainee attended face-to-face activities (theoretical prelections and practical activities in the ICT laboratory), but also on-line activities, in two continuous professional training programmes, enriching in this format, their ICT and Web 2.0 competencies in the teaching methodologies of disciplines framed in the *Mathematics and Natural Science area* [4]. All the training materials and the required tasks were organized in an educational platform (portal), special designed at the beginning of the project.

Their feed-back was recorded using a questionnaire which had [5]:

(a) three items with pre-coded answers, structured on a Likert type appreciation scale, with five steps, defined as: *in a very great measure*, *in a big measure*, *in a moderate measure*, *in a small measure*, *in a very small measure*;

(b) three items structured on a scale from 1 to 10, whereby the trainees asserted their opinions regarding the used resources available on the electronic platform, but also concerning the impact of the training programme on their instructional work.

3. Results and Discussions

The use of New Technologies in school allows the elaboration of new instruments for the production, use, storage and delivery of the educational content. The acquisition, delivery and inventory of New Technologies is often made in formats of the social information (*2.0*), the students being familiarised from the early ages. A large area of platforms, providers of pedagogical contents are available for teachers, and on the other hand, he/she can produce himself/herself digital materials, appealing to the web 2.0 applications or multimedia. In this way, the learning process and the class management can be flexible, adjusted and adapted for different contexts, by the usage - for example - of a management / educational platform of the learning process [6].

Teachers from thirteen departments in Romania, who teach in primary, second and college degree schools, formed our sociological sample. All of them teach scientific disciplines – mathematics, physics, chemistry, natural sciences, geography – and the selection of the sample was made by this criteria, more specifically, the discipline that they teach. The average age of the sample (530 persons) is around 35-40 years. What is very interesting is the fact that shows us no differentiation in options and opinions between the younger and the older teacher generation. All subjects participated by their own will and they gave the consent about the implication and measurement of this project.

In this respect, most of the trained teachers (72%) considered the management / educational platform in which they worked for the ProWeb project, as a good and a very good environment to be used in the teaching process (Fig. 1).

Moreover, Fig. 2 illustrates that the majority of the trainees considered that they can easily access the educational resources made available by the trainers (teachers trainers and assistants trainers) in the frame of the project.

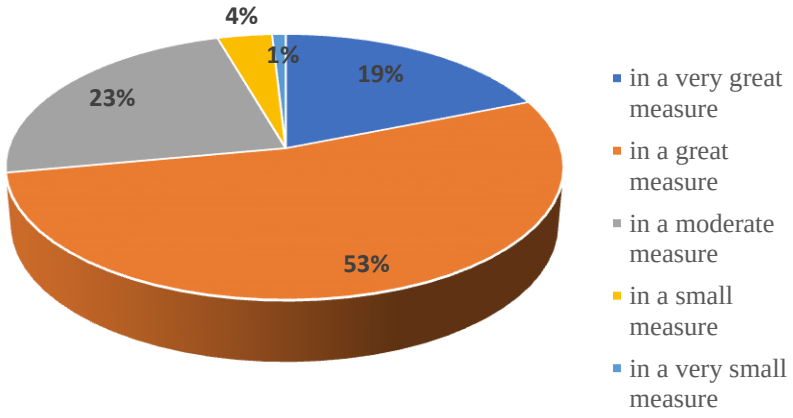


Fig. 1. Trainees' rating concerning the using of the management / educational platform in the teaching process

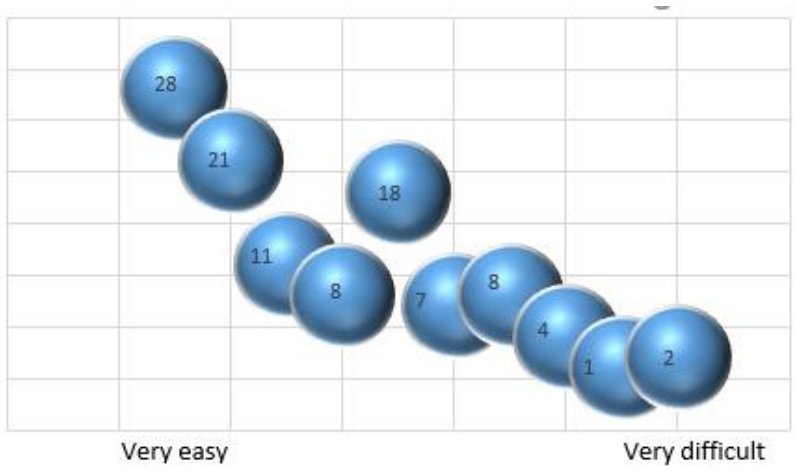


Fig. 2. Trainees' rating concerning the access of the platform resources

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Figure 3 expresses that the training program has a huge impact (91%) on the trained teachers, proving that both programmes had been well designed and structured. Thereby, at the end of the training, the trainees completed the modules with new useful knowledge related to their didactic experience.

Moreover, Figure 4 illustrates that a great part of the trained teachers appreciated the training programme as accessible, with trainers well prepared, training resources well organised which answer to their necessities and development.

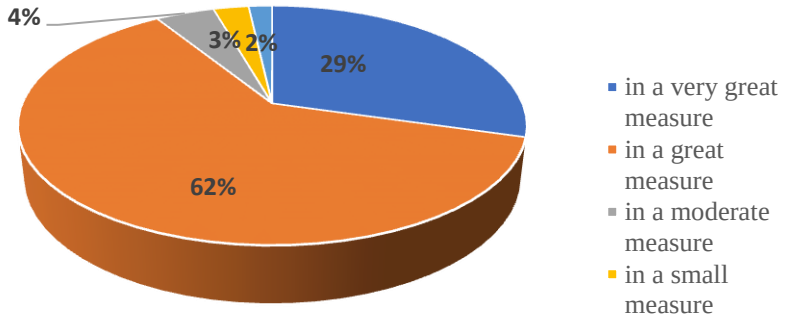


Fig. 3. Trainees' rating concerning the impact of the training programmes

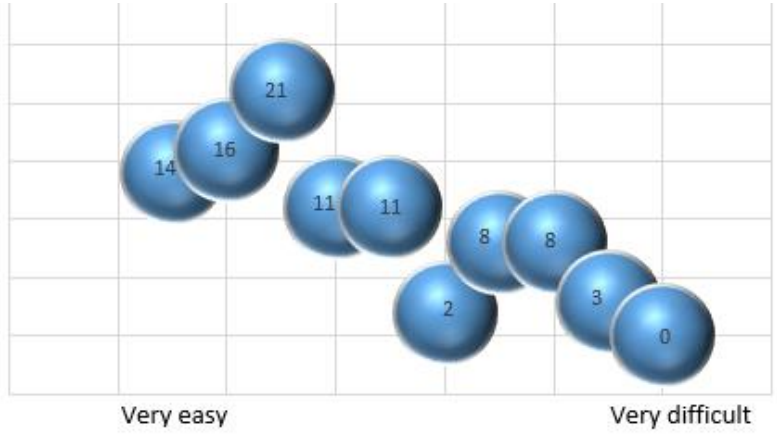


Fig. 4. Trainees' rating concerning the accessibility of the training programme

Figure 5 shows the general level of satisfaction regarding the content of the training programmes. These programmes were appreciated as being very elevated and corresponded to the expectations of the trained teachers.

More, Figure 6 illustrates that a big part of the participants considered the training content as actual and in accordance to the professional standards, meeting the expectations and allowing a proper addressing/interaction between trainers and trainees.

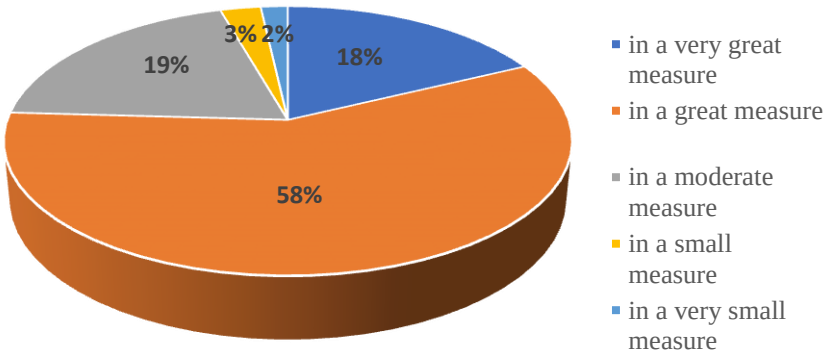


Fig. 5. Trainees' rating concerning their satisfaction regarding the content of the training programmes

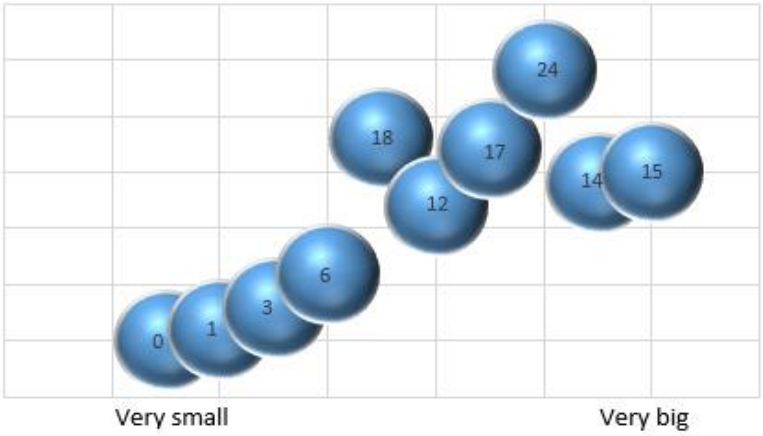


Fig. 6. Trainees' rating concerning the training content as actual and meeting the expectations

4. Conclusions

The use of *New Technologies* allows approaching more creative learning, appealing to multimedia video and audio applications, to informational games, to the 3D virtual reality or other immersive media. The

mobile communication devices, beside the classical computer, can be introduced more courageously in the instructive-educational process, especially to sustain the individual study and personalized learning.

Therefore, the social information allows overcoming the barriers of time and space, sustaining communication, interaction and collaboration between all the social actors of the learning process, but also between institutions.

Even the opportunities offered to use multimedia and web 2.0 in the elaboration of new innovative practices of learning and teaching are appreciable, the implementation of the Learning 2.0 paradigm is confronting with a series of pedagogical and organizational obstacles. Thereby, a rickety technological endowment of schools limits the access to the services provided by New ICTs. The lack of students' digital competences, but mainly the lack of teachers' digital competences, can constitute other major impediment. Some conservatory practices, established in the learning institutions, can really seriously inhibit the implementation of the new educational content, based on ICT features. The financing of the learning, the insufficient and weak qualified personnel, represent other factors which can detain the transition to the Learning 2.0.

In the process of going to modernism and making an efficient learning process, the teacher role is determinant, a fact that is certified also with the occasion of the meetings with teachers, in the frame of the ProWeb project. The results presented above attest that teachers have the availability to be actors involved in the process, they are capable to facilitate the changes, they are promotors of innovation, and they are the followers to the introduction of new learning practices. Also, they have manifested the availability to improve or to actualize permanently their own digital abilities, to experiment responsibly, to assume new roles and to integrate creatively new instruments of web 2.0 in the contemporary practice in their schools. In this respect, the efficiency of the continuous professional development programmes has been appreciated at a high level, and - consequently - the gained knowledge is about to be used in new training initiatives.

Acknowledgement

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The authors of this paper declare, on their own responsibility, that the subjects who participated in the research have been informed related to the voluntary nature of their participation, the understanding of the received information and the fact that the withdrawal from the research process can be done at any time without any negative consequences on participants. The whole research respected the actual ethical standards and the participants expressed their consent to participate in the undertaken research.

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