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TEACHING VALENCES OF MOODLE E-LEARNING PLATFORM

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Summary. The paper presents our experience of using Moodle e-learning platform to create a curricular auxiliary for one of economic subjects taught at school. We wanted to emphasize not only the facilities of Moodle e-learning platform through resources and activities, and to identify the educational purpose for which they can be used. On the other hand, we were interested in the opinion of students to use Moodle as the learning management system. The results of the exploratory research that we made during the school year 2014-2015 are presented as a case study, which highlights many aspects of blended learning and teaching using Moodle in the classroom.

Keywords: *blended learning, Moodle, e-learning, learning management system, virtual classroom*

Zusammenfassung: Diese Arbeit beschreibt unsere Erfahrungen mit der e-learning Plattform Moodle in der Erstellung von Lehrmaterial für ein, an einem Gymnasium unterichteten Wirtschaftsfach. Ziel der Arbeit ist nicht nur die Funktionen von Moodle in der Erarbeitung von Lehrmaterial hervorzuheben, sondern auch die Identifizierung der didaktischen Ziele im Einsatz dieser Lehrmaterialien. Ein weiterer Bestandteil unserer Untersuchungen war ein Feedback seitens der Schüler, die diese Plattform als unterichtsbegleitendes System benutzt haben. Die Ergebnisse dieser Untersuchungen wurden als Fallstudie dargestellt und beinhalten Daten aus dem Schuljahr 2014-2015. Diese Fallstudie beschreibt verschiedene Aspekte, die im Zusammenhang mit der Benutzung von Moodle im Schuluntericht stehen.

Schlüsselwörter: *blended learning, Moodle, e-learning, Lernmanagement System,virtuelle Unterichtsklasse*

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I. Introduction

Computer Training represented for contemporary school a new challenge, thanks to the advent of virtualization phenomenon of education. Its upward trend is due to the combined action of several factors such as the unprecedented growth of knowledge, the increasing need for training and facilities offered by new information and communication technologies. Virtualization is, by definition, the replacement of components or aspects of real life made by means of information, particularly computer [Cucoş, 2006].

The virtualization of education that takes place in contemporary school (and who Romanian school is no exception), is a consequence of the complex process of globalization. This is an objective and irreversible process; not much has changed in essence, but it has added new dimensions, including social and cultural dimensions. "Globalization with a human face" is a phenomenon that takes into account the interests of all individuals, boosting economic growth, disseminates advanced technology and determines a higher standard of living [Postelnicu & Postelnicu, 2000]. Known as one of the most controversial phenomena of the modern world, globalization has influenced the specific strategies and education achievement. The relationship between globalization and education is two-dimensional. On the one hand, globalization is reflected in the trend of convergence of educational models and the realization of a match (even partial) between national education systems of several countries. On the other hand, education is a vector and a result of globalization expressed by international assessments of national education systems (see PISA tests) and movements of pedagogical theories all over the world [Cucoş, 2006].

Direct consequence of the virtualization of education is changing the methods used for teaching, learning and assessment, which is now directed towards empowering the individual student learning through collaboration and co-generation depth and content to be learned by students [Cucoş, 2006].

Unfortunately, in the Romanian scientific literature are only several papers about the subject, the most part of them are descriptive than applicative [Brut, 2006], [Adăscăliţei, 2007].

In this framework is encompassed our approach to use Moodle e-learning platform (and therefore computer) in teaching classroom by creating a curricular auxiliary for one of economic subjects taught at school. On the

other hand, because the relationship between teacher and student is computer-(inter)mediated forced us to use for teaching, learning and assessment some methods and models of Blended Learning.

II. Using Moodle e-learning platform

Moodle e-learning platform was launched in Australia in 2002 and is available in over 70 languages, including Romanian. The name comes from the abbreviation are suggestive terms in English: Modular Object-Oriented Dynamic Learning Environment (MOODLE).

Located today in version 2.9.2+, Moodle can fall into several categories:

- Open Source Program, which can be used free of charge without users pay any fee for license;
- Learning Management System (L.M.S.);
- Virtual Learning Environment (V.L.E.);
- Content management system (C.M.S.).

Using Moodle has some advantages and disadvantages which we present below[3]:

a. Advantages:

- Posting lessons, themes and references that are accessible to all students;
- Assessment and respect, self knowledge through tests, games, etc;
- Creating virtual classrooms (within a school and between schools);
- Communication between users (teachers, students, visitors, administrator);
- Organizing competitions on various topics;
- Development of projects of various kinds between schools;
- Check the originality projects loaded.

b. Disadvantages:

- Informational harassment for students;
- Social isolation, similar as in social networks;
- The time required for the creation and implementation of the course.

These disadvantages are diminished considerably by following aspects:

[3] ***- "Developer of e-learning course on Moodle", eLearning &Software S.R.L., Constanța, August 2015

- User-friendly interface;
- Ability to be updated whenever necessary;
- Accessibility extraordinary (anytime, anywhere, even outside the classroom);
- Reusability.

With the introduction of Moodle in teaching, there has been a paradigm shift by moving from real class to virtual class, and from traditional learning to e-learning. If former pedagogy aim was acquisition of large amount of knowledge by students, today pedagogy focuses on skills training, the most important being access and information management, respectively knowledge. The computer is actually the means by which students are involved direct and personal in the process of knowledge. In other words, the "pedagogy of memorizing" was replaced with "pedagogy of searching" [Cucoș, 2006].

Virtual Classroom is an expression of reconfiguration learning groups, determined by the virtualization of education. The purpose of creating virtual classroom is to train students not only in school but also outside it, helping them to assimilate quickly and effectively new knowledge. In this way, the teacher can continue teaching outside school hours. The teaching aids used in the virtual classroom were removed from the classical model of printing on paper, being preferred combinations of audio-video materials, such as materials recorded and live broadcasts.

III. Blended learning

In cyberspace are several definitions of blended learning. The meaning has changed over time, so are considered valid only definitions developed since 2006. Such a definition indicates that "blended learning designate range of possibilities represented by combining the Internet and digital media with known forms of learning in the classroom, requiring physical co-presence of teachers and students" [Friesen, 2012].

Blended learning is achieved through learning management systems (L.M.S.), as is the Moodle e-learning platform. They facilitate the differentiation of content, process and product of learning.

Preliminary research conducted on blended learning suggests that this may provide the following advantages:

- Promote critical thinking and enhances achievement of students;
- Build the skills necessary for working and living in our century;
- Produce a greater sense of community than for face to face learning or online learning;
- Increase interaction between student and teacher, but also between the pairs of students;
- Transform the practice of teaching and learning;
- Encourage students to take control of their own learning[4].

Blended learning depends on regular access for teachers and students to computers and the Internet and that they know how to use computers. The teacher and students participate in blended learning in a computer lab or in a regular classroom, where students have access to computers for a specified period of time[5].

IV. Models used for blended learning

In essence, blended learning is a formal education program, which combines/integrates learning in front of with information technology-based learning in different proportions. Characteristic of blended learning is bringing together the advantages they have classical learning and online learning, namely quality, flexibility and memorabilia, plus unlimited access from anywhere and any time, resources, learning, and the ability to learn at your own pace.

In cyberspace are several classifications of models according to that blended learning can take place, listed below.

Widely practiced especially the U.S.A., Canada, Great Britain and New Zealand, blended learning has undergone some modification of the earlier classical models. Thus, new forms of learning derived from the original as Hy-Flex (Hybrid Flexible)[6] and Flipped Classroom "In-Class"[7].

[4] source: www.edu.gov.on.ca/elearning
[5] source: www.elearningontario.ca
[6] source: www.onlineuniversities.com
[7] source: Gonzalez, J. - "Modifying the Flipped Classroom: The "In- Class "Version", March 24, 2014

Table 1. Classification of blended learning models

Christensen Institute Classification (a)	Knewton Classification (b)	Connections Learning Classification (c)

• **Rotation**
  ○ **Station Rotation**
  ○ **Lab Rotation**
  ○ **Flipped Classroom**
  ○ **Individual Rotation**
• **Flexible**
• **À la carte**
• **Enriched virtual**
	• **Face-to-face Driver Rotation**
	• **Flex**
	• **Online Lab**
	• **Self Blend**
	• **Online Driver**
		• **Online Lab Model**
		• **Self-Blend Model**
		• **Rotation Model**
		• **Flex Model**
		• **Online Driver Model On/Off-Site Rotations**
		• **Fusion Lab Programs**
		• **Fusion Supplemental Programs**

Source: (a) www.christenseninstitute.org
(b) www.knewton.com
(c) www.connectionslearning.com

Courses conducted by elements from popular Hy-Flex combines online learning with classroom learning from resulting in a so-called "flexible hybrid", which increases the flexibility of the courses. This model is the right solution for students who commute to schools that have to face problems of insufficient space of classes and budgetary constraints.

Under this model, students have the freedom to study when and where they want, based on their own needs, desires and preferences. On the other hand, they can choose between online learning, classroom learning, or both. Study materials for students are offered both in traditional format and electronically (online). Among the advantages of this model are those students can form some meta-cognitive skills, while having greater control over their own learning experiences.

V. Methodology and research results

In order to assess the impact that Moodle e-learning platform and blended learning had on school pupils, we developed a questionnaire of opinion, available on-line at www.isondaje.ro/sondaj/391883307.

The questionnaire contains certain questions, such as questions of identification, control questions, dichotomous questions, multiple choice questions, and questions the scale of assessment for students' opinion on two topics. Research results were statistically processed and we present it below.

In conducting our research, we took into account the recommendations and conclusions presented in the literature abroad, at other research in the computer-assisted learning [Lipponen, 2001], [Carr-Chellman, 2011].

V.1. Case Study

Exploratory research[8] was conducted from 15th to 26th of June 2015. In this research, we conducted a case study by direct observation of students in eleven grade, specialty Technician in economic activities from Technological High School "Alexandru Borza" Cluj-Napoca. The study population consisted of a total of 16 school pupils, and the average age was 17.1 years.

Table 2. Gender structure of the population studied:

No.	*Gender*	*No. of students*	*%*
1.	Male	5	**31.25**
2.	Female	11	**68.75**
3.	**Total**	**16**	**100**

[8] Unfortunately, the current teaching loads did not make possible to create a full experiment where the teacher teaches the same subject at two different school classes in different ways, traditional and via Moodle.

V.1.1. Making curricular auxiliary

We conducted a curricular auxiliary[9] for module practice "Payment Instruments" at eleven grade, specialty Technician in economic activities. To develop this auxiliary curriculum, we used resources and activities offered by the e-learning school platform, equipped with standard Moodle functionalities. This platform can be accessed at https://alexandruborzacj.moodle.ro

We have grouped the Moodle platform specific resources and activities according to their didactic purpose, namely communication, teaching, learning and assessment (see table below):

Table 3. Grouping Moodle resources and activities according to their didactic purpose

Teaching purpose	Communica-tion	Teaching	Learning	Assessment
Moodle resources and activities	- Forum (*); - Chat (*); - Questionnaire; - User report.	- Book; - Glossary; - Power Point/Slide; - Videofile; - Web page; - URL.	- Assignment; - Essay/Assignment; - File.	- Journal; - Real-time quiz; - Questionnaire; - Big Blue Button (Virtual Classroom).

(*) The two resources can be used also for teaching, learning and assessment.

In order to achieve curricular auxiliary, we have done the following steps:

- We have identified the skills that school pupils must meet (given in the school curriculum for the subject);
- We have identified teaching activities necessary to achieve the objectives (ex. communication, teaching, learning, assessment);

[9] A curricular auxiliary is a teaching material helping teachers and students to use in teaching-learning process for adequate and effective implementation of the curriculum. Source: www.tvet.ro/index.php/ro/curriculum/153.html

- We assigned subject content provided on the number of weeks for internship;
- We added for each week of course some Moodle resources and activities required to facilitate the acquisition of knowledge, skills and skills training, that interaction with students;
- The topics addressed by the students were loaded onto the e-learning through their user accounts and were checked manually by teacher;
- We published the marks and corrections through user report immediately after homework and grading was done individually.

Resources and weekly activities added during the course were homework, assessment tests, chat, videos, glossary, discussion forum, Power Point presentation, and the user report. We added a traditional resource in digital format, which students can use during the course, namely an auxiliary curricular realized within the Phare TVET program. As an external resource, we added the websites of the National Bank and commercial banks in Romania. In doing so, we designed an interactive course that corresponds to medium/advanced level[10] (according to the Methodology on the implementation of Blended Learning System, developed by Bucharest University of Economic Studies).

Curricular auxiliary structure designed by us and uploaded to the Moodle platform includes:

- Introduction (Title of auxiliary, grade, specialization, school year);
- General skills of the discipline;
- Planning Documents (biannual planning and planning on learning units);
- Learning Units;
- Specific resources / bibliography;
- Further reading;
- Internet resources.

Lessons of synthesis and evaluation tests were performed on the handbook approved by the ministry for practice module (published in 2007). Student assignments were designed based on curricular auxiliary developed within Phare TVET program (published in 2006).

[10] source: online.ase.ro/Metodologia_BL.pdf

V.1.2. Blended learning methods for using Moodle platform

The blended learning has been achieved during the whole period of practice. *The first week of practice* (November 17 to 20, 2014) was conducted after the traditional "face to face" method of learning, when students did practice at various companies in the city. There they discussed with employees at the departments of accounting and management firms with various issues related to payment instruments. Students have completed their practical portfolio with accounting documents and payment instruments used in the respective companies.

The second week of practice (June 15 to 19, 2015) was conducted on blended learning model rotation. Rotation was experienced between actual classroom and computer lab. At first, we used version rotation between workstations. They were made up of individual work portfolio of practice (worksheets and documents typed), group work (essay and diary practice), looking information necessary for drafting essays (on-line), homework and assessment tests (on-line).

Due to the attraction and the special interest of students for information technology, at the end of the second week of practice and especially in *last week of practice* (June 22 to 26, 2015), we experienced online laboratory version, with added virtual classroom. According to this model, the rotation between workstations was performed in the lab. The entire content of the course was already loaded on the e-learning platform of school, and students studying and acting on the material taught in the computer lab, located inside the school. Students who have participated in the online laboratory took also traditional course in receiving explanations and information from teacher.

In the virtual classroom[11], the working session included a Power Point presentation about the use of payment cards in Romania and a demonstration movie about the transfer money via mobile phone. The students answered at on-line teacher's questions about two topics via chat. In this way, we obtained an immediate feedback on the knowledge acquired through online learning.

[11] We would like to express our thanks to Edu Moodle Romania network for the opportunity to achieve virtual classroom.

At the end of practice, each student received a certificate of participation (Simple Certificate) in the first course conducted using Moodle, which they downloaded from the user account.

In blended learning achievement, we respected as much as possible the steps proposed for this type of learning [Avramescu, 2014]. Thus, we had a first meeting face to face with the students before the start of practice, we set the rules of the course and we have shown how to access resources and activities posted on Moodle through examples. We showed at the students what results we expect from them, establishing means of communication that we use throughout.

Knowing that it is very important to communicate with members of the group/community learning, we had frequent conversations (both face to face and online) with students, especially during periods when they worked individually. On the Moodle platform we posted some activities for students to be involved and interact with peers or the teacher. Activities were both synchronous and asynchronous as the latter followed by a joint feedback.

Course content was common to all students. We have tried to present it in traditional form, but also in the online form, being centered on the powers provided in the syllabus module "Payment Instruments". On the other hand, we motivated students to access online course, informing them that the number and duration of connections made are important.

The teaching-learning and assessment were conducted in small groups made in the classroom. Formative evaluation was carried out during the period of practice, through the homework, tests and journal practice. The evaluation was conducted face to face in the computer lab, taking into account a user report generated for each student. We have tried to offer the students a continuous feedback, which allows us to correct any mistakes during the activities.

V.1.3. Designing Training Course

The teacher plays a multiple role in designing blended learning lessons within [Avramescu, 2014]. It begins with designing rigorous activities to be carried out and continue uploading the necessary resources on the e-learning platform (using the teacher account as course editor), directing learning in

classroom and online communication with students. Resources and activities must be chosen carefully so as to achieve the skills that students should acquire participating in the course. On the other hand, contact with students must be stressed, and communication between teacher and students within the learning community must be maintained both synchronous (chat or webinar) and asynchronous (using forum, blog or email). It is important to keep computer assisted learning "complementarity between the real and virtual" because the real aspect of learning fosters "social bond, sensitivity and emotion without which receives intelligence sense" [Cucoș, 2006, p. 43].

Regarding the design of teaching activities, we took into account of the components of a constructivist classroom, as it is presented in the literature [Carr-Chellman, 2011]: the pursuit of authentic activities, social context, offering multiple perspectives, knowledge building and meta-cognition (reflecting on his own construction). On the other hand, a constructivist classroom has certain characteristics, namely: problem-based learning, group work (through cooperation or collaboration), learning, exploring, authentic assessment (through portfolios, products and performances created by students) and a visually rich learning environment. In doing so, constructivist concepts can be integrated into the design of the training.

The steps to be followed to give students an exciting and good learning experience are [Carr-Chellman, 2011]:

- Purpose of training;
- Identifying training objectives;
- Develop items for evaluation tests;
- Analyze the characteristics of the students;
- Selecting necessary study materials;
- Selection of teaching methods;
- Implementation of the training plan;
- Evaluation and review of the training.

The basic idea, which runs like a red thread this model of professional design training, is to align the goal with training objectives, which in turn must align with test items, activities and teaching resources, etc. It must select those tools and activities that support the aim and objectives of training, even if they are not too fun or comfortable for pupils and the teacher. On the other hand,

they should be used in a more creative way possible to get good results. Since training design is an iterative process, flexible and open training materials and methods used for this must be tested and verified with a population similar to the target population (if possible), and then be reviewed. For us, this was not possible, so we were forced to make the necessary adjustments during the period of students' practice. We overlooked the fact that the classes were held during the summer, pending the great holiday.

In terms of benchmark tests we have developed for this course, their goal was not so ranking the schoolchildren, but we had the intention to see whether students have achieved the intended learning objectives. The results of students' assessment in evaluating training are presented below.

V.2. Research results

In the studied population, the vast majority of students (87.5 % of the total) have Internet access. An identical proportion uses the Internet to study or do homework. The modalities for accessing the Internet indicated that students use their own computer and mobile phone, as shown in the following table:

Table 4. Ways of accessing the internet by students

No.	*Ways of accessing*	*No. of students*	*%*
1.	Computer (P.C., laptop)	12	**46.2**
2.	Mobile phone	10	**38.4**
3.	Tablet	2	**7.7**
4.	School computers	2	**7.7**
5.	**Total**	**26**	**100**

Almost half of the students know what is an e-learning platform (56.3 % of total), and mostly used the platform for the first time (81.3 % of total). Most students surveyed indicated that the e-learning platform of high school is useful and easily accessible (see table below):

Table 5. The students point of view about the school e-learning platform

No.	*Students opinion*	*No. of answers*	*%*
1.	Easily accessible	4	**21.0**
2.	Helpful	9	**47.4**
3.	Interesting	5	**26.3**
4.	Attractive design	1	**5.3**
5.	**Total**	**19**	**100**

V.2.1. Training evaluation

Regarding training evaluation, we were interested in the following aspects:

- Resources and activities on the platform;
- Skills of students;
- Enhanced learning (including blended learning);
- Interactions involving students.

Most agreed Moodle resources and activities by students were web pages and assessment tests (named real-time quiz) (each with a share of 23.1 % of the total), followed by chat (19.2 %), as shown in figure below:

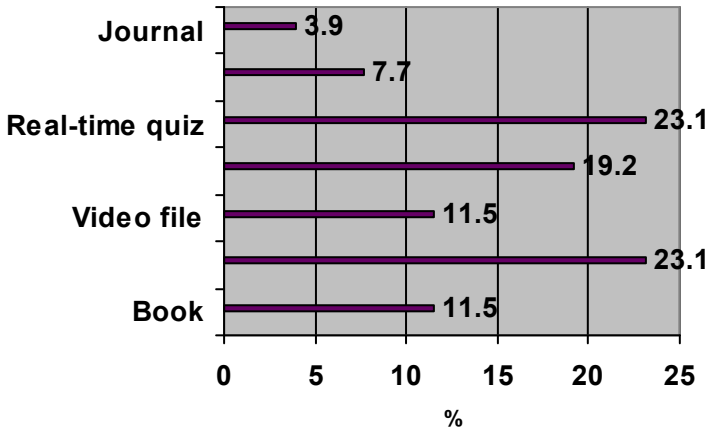

Fig.1. Moodle resources and activities agreed by students

The on-line assessment tests seem to be more attractive for school pupils than paper tests (23.1 % of total enjoyed it). They like to communicate with their colleagues using chat (19.2 % of total enjoyed it).The web pages and video files were also liked by students (23.1 % of total, respectively 11.5 %).

The vast majority of students surveyed felt that resources and activities help them to acquire/deepen expertise (see Figure 2):

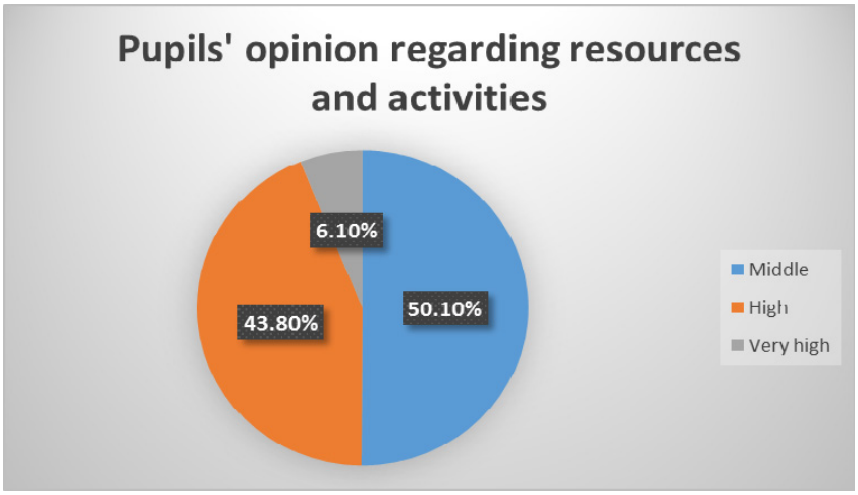

Fig.2. Extent to which resources and activities facilitate students to acquire knowledge

The main part of students (around 50 % of total) was pleased about the extent to which Moodle resources and activities helped them to acquire knowledge during the period of practice.

In this context, the students appreciated the *glossary of specialist terms* posted on the platform so: it is useful (66.7 %), is easily accessible (11.1 %) and is simple to use (22.2 %). The *homeworks* posted on the platform were considered available to half of respondents (50 % overall), easily resolved (33.3 %) and easy to send teacher (16.7 %). A usefulness meeting by *chat* with fellow pupils was appreciated for the following reasons: homework (37.5 % of total), obtaining information about the course (25 %), communication with colleagues (25 %) and solving tests (12.5 %).

By using high school e-learning platform, we have improved following skills of pupils:

Table 6. Skills improved by using Moodle

No.	*Students skills*	*No. of students*	*%*
1.	Digital skills	9	**50.0**
2.	Specialist skills	5	**27.8**
3.	Initiative and entrepreneurship	1	**5.5**
4.	Communication with colleagues/teacher	3	**16.7**
5.	**Total**	**18**	**100**

Using the Moodle e-learning platform helped the school pupils to improve mainly their digital skills (50 % of total), specialist skills (27.8 %) and communication with others (16.7 %).

Students preferences are divided somewhat equally among the three forms of learning practiced as follows: face to face learning (in class) 31.3 %, 37.4 % online learning and blended learning 31.3 % of the total answers received.

Students' opinion about blended learning methods is varied; most respondents having a good opinion (see fig. 3):

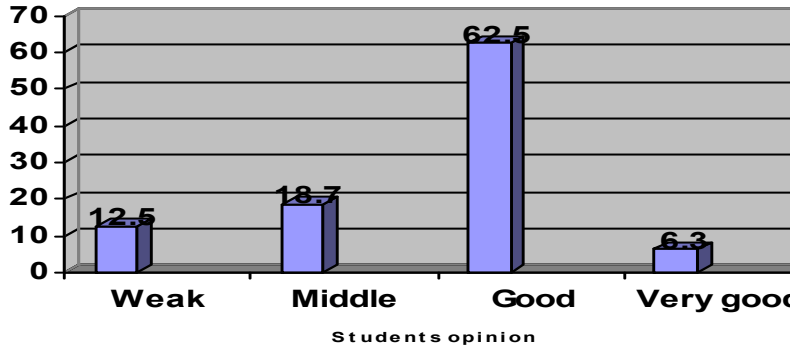

Fig.3. Students' opinion about using blended learning methods

The main part of students (62.5 % of total) has a positive opinion about using the methods of blended learning in classroom.

When using e-learning platform, it have been several types of interactions involving students, namely: student-student (31.8 % of responses), student-teacher (40.9 %), student-learning community (9.1 %), student-learning materials (9.1 %) and student-information technology (9.1 %). It notes that prevailing classical interactions between students and between student and teacher, probably due to the novelty of the teaching methods used.

The vast majority of students (93.8 % of total answers) consider that the lessons conducted online through virtual classrooms helped to acquire expertise.

Regarding the assessment carried out through online tests, it was considered as objective (41.2 % of total), easily achieved (47.1 %) and feed-back received immediately (11.7 %). User report facilitated receiving a good feedback (58.8 % of responses), complete (29.4 %) and operative (11.8 %).

V.2.2. Students assessment

Marks received by pupils at each of the two tests confirms the positive impact of blended learning on the knowledge acquired using Moodle e-learning platform, as shown in the following figure (see Figure 4):

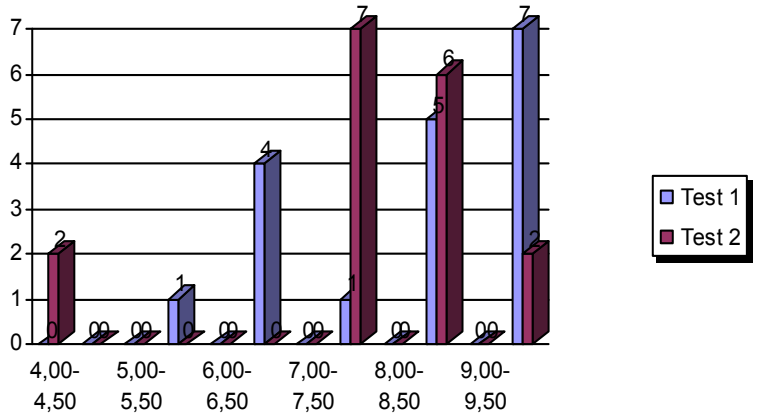

Fig.4. Frequency of marks obtained by school pupils on assessment tests

Average class for the first test (18 students were presented) was equal to 8.58 (eight 58%) and for the second test (17 students presented) was 8.04 (eight 04 %). Most of the students had scores above the threshold of mediocrity (greater than 7). At the first test, 13 students were above the threshold and 15 students for the last test.

VI. Conclusions

Implementation of Moodle e-learning platform in the high schools in our country is just beginning. Our effort to create a curricular auxiliary for economic discipline and to use the e-learning in classroom teaching is part of the broader trend of openness and internationalization of education in Romanian schools.

Our objective was to explore the opinion of school pupils regarding the Moodle e-learning platform use for teaching and learning economic subjects. Information collected from them suggested that blended learning methods are more suitable for educational process than the traditional learning methods. The results of this study encourage us to continue the implementation of blended learning and the Moodle platform use in classroom teaching.

Using computer assisted learning, respectively blended learning methods correspond to a permanent attractiveness of students for computer and other electronic means. This allowed us to carry out an interesting and dynamic training, where the students participated in multiple interactions. In doing so, the students have improved digital competence and expertise, worked and communicated better than within a traditional classroom activities.

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