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**Online contest based on integration of activities, adaptability and students cooperation
using Ilias LMS**

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Abstract: Generally, learning management systems (LMS) offer the possibility to create lectures and test together with their analysis. In order to achieve a better overview of the preparation activity content integration is very useful. This is achieved by lectures and tests structuring together with a calculus of the structure scores. Thus we can be obtained an overview of the preparation that can be laid out on domains or disciplines and analyzed in details for quality assessment. In the context of an ISJ Alba Iulia project where 15000 students from 3 to 12 grade were enrolled such a lectures and tests integration was implemented based on the Ilias LMS. The scores were computed separately on dimensions like Learning and Evaluation, in detail, from the levels of key competence domains, on disciplines, on lessons and on tests. The lessons and tests were grouped on levels in the context of specialized instruments for which they offer the preparation and evaluation activities. The students has a permanent record of the accumulated scores from the total score that could be queried to the lessons level. For the created contest the LMS was extended with facilities to be able to create interactive and adaptive lessons, student cooperation by sending invitations, etc. The integrated approach was well received by the students because the activities resemble to a game where the scores are obtained by solving the proposed tasks. Although the contest period was short the students achieved a double score that the one needed to achieve the prizes. Thus, this approach seems to be a useful mean for student motivation.

Keywords: Ilias LMS, student contest, scores

I. INTRODUCTION

In this paper we will present the principles of student contest web application together with its results dedicated to primary and middle school students. Nowadays students lack motivation and an efficient way to stimulate their involvement is to implicate them in educational games.

In order to implement a quality approach in authoring lessons and tests we took into account the most recent discoveries regarding human nature. The human is an integrated and integrable system and it must take it as such [14]. The leverage points for a human are its needs [12,14]. According to SDT [13] the three fundamental needs are the need of autonomy, competence and integration. Because satisfying the competence need drives the satisfaction of other remaining needs, we planned its satisfaction first.

In order to facilitate the competence amelioration [18], the materials were organized on cultural levels [9]. The psychological changes obtained by learning are fulfilled only if the attitude

related to problems is changed, in certain contexts [10]. This shows how much somebody is prepared to handle a situation. Attitudes change only if new instruments are mastered. Mastering new instruments is fulfilled through an inner game [5]. If it favors competence development then it is a mean for a good personal and group integration. Competence amelioration seen as a quality participation [17] grows the inner thrust of the others and creates a very good physiological state where the major gain is the oxytocin release by the thrust mechanism [15]. This hormone is very important for the state of wellness, health and the quality of the social relationships. Thus, the approach is complete from the cultural reality [11] to the physiological one [19]. Focusing on instruments that helps us satisfying the fundamental human needs, independently of culture and on the amelioration of its use the cultural limitations were overcome thus, resulting a transcultural approach.

The modifications and extensions to the Ilias [7] LMS were made in the context of the project entitled “Why, how and what do I learn?” implemented on European funds in the fall of 2015 having as beneficiary the Alba County Schools Inspectorate. In the project participated 15.000 students from 3 to 12 grades living in Alba county, Romania. The project objectives were to motivate students to learn and to familiarize them with a few instruments in each competence domain, shown from a trans-disciplinary and integrative perspective.

The paper is structured as follows. In chapter II we discuss general aspects regarding the organization of the student contest. In chapter III we present the integrated management of the lectures and tests. Chapter IV presents the contest configuration and results tracking process. In chapter V we analyze related works. Chapter VI concludes and set the perspectives.

II. CONTEST IMPLEMENTATION

The project objectives were implemented by organizing a contest between students benefitting from lessons in order to accommodate with the thematic and also evaluation tests. The stake of approaching new topics, is stimulated if the undergo is organized as a contest with consistent prizes: 50 prizes of 400 lei for the first places, 150 prizes of 300 lei for second places, 150 prizes of 200 lei for the third places and 14.650 participation prizes.

In order to have the precise image of student accomplishments both lessons and tests have questions whose results are stored. The difference between the lessons and tests is that in the context of lessons the questions are preceded by a material which allow the studying of concepts which are later the answers for the questions. For example, many lessons had a video material before the question.

The application developed on the top of the Ilias [7] platform allows creating multiple contests, each having its own score. The access on the age levels of the contest was left free, but there is the possibility of setting options to invitation based access or password based access, etc.

One of the main challenges of the contest is to assure unitary presentation and approach of the materials, in spite of the fact that they were from all competence domains. In order to solve this problem we adopted an integrated and trans-cultural perspective. We noticed that each culture offers different tools that the man can handle successfully several situations or in order to solve different problems. Thus, were presented several useful tools to the people, developed in several disciplines and on different area of competences. By the tool concept we mean anything that a person can use in order to satisfy its needs. These tools can vary from sentences to mathematical operations with a certain type of numbers, etc.

The five levels of approach were set starting from the five cultural levels of [9]. The attitude of a person related to a situation is given by the tools that he possesses in order to handle the situation and the master level for operating with them [10]. Mastering the handling of tools is a made step by step starting with the recognition of their presence (level 2) to their trans-disciplinary use (level 5). On level 1 we presented the consequences of the tool lack.

III. LESSONS AND TESTS INTEGRATED MANAGEMENT

A certain competence domain or even a certain discipline chapter rarely can be evaluated throughout a single test. In the most widespread versions of LMSs we have computed scores or a certain mark associated to a test. For students and teachers the separate test results visualizations are

not sufficient. Each score is part of a wider thematic and an overview is useful to evaluate competences in several domains.

In the context of the implemented project the lessons and tests were grouped on cultural levels, age levels, tools and competence domains. Thus, each instrument was assigned to a certain discipline located on a certain competence domain. For each tool we associated a number of 5 lessons or tests, one on each cultural level.

Due to the fact that lessons and tests can have more or less questions, and questions have different difficulty levels we decided to set a certain score for each test to be accorded when the passing condition is fulfilled. For example the score on the tests should be greater than 70%. Taking into account the structures in which the tests were nested the results could be visualized on both types of activities: Learning or Testing, on age levels (we used 5 levels). On each age level we find 8 levels of competences, where we can find one or more study disciplines. On each discipline we can have one or more instruments, on each instrument we can have one or more lessons or tests.

In Figure 1 one can notice a detail seen by the eyes of an administrator, namely that in the implemented contest session 2015 we have on the Learning level the possibility of getting a score of 3690 points where 580 points are on Level 1 (grades 3-4).

On the competence level 1 named Native language we have 100 points, all allocated to Romanian language. We have 50 points for the lessons on each Tale instrument and Novel instrument.

On the competence level 3 named Mathematics and Digital Technologies we offer 50 points for the successful learning of the 5 Mathematics lessons on the Numbers and operations instrument. On red background we find the terminal nodes of the hierarchy associated to lessons. Each item in the tree has a link towards the presented content.

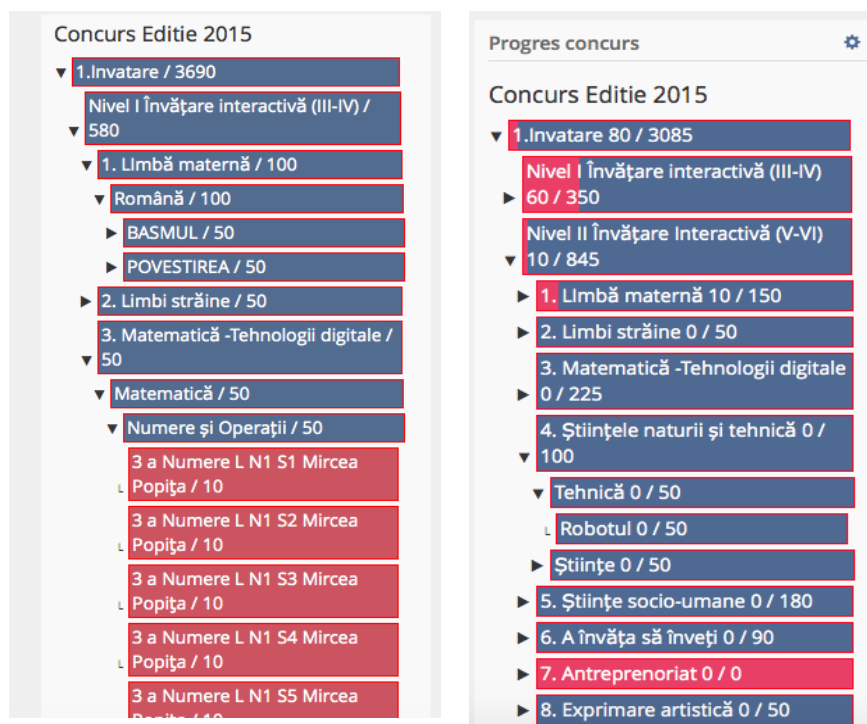


Figure 1. Student contest competence tree - administrator and student views

The students see a similar structure, in addition they see their personal score on each item and sums of scores on each inner node. The fact that there is a total score permanently written on the screen and the hierarchical organization on age and difficulty levels give the students the game sensation which cannot be obtained in a classic framework. The organization of materials on instruments and not on lessons contributed a lot to get such student participation. This assured the contest to run in good conditions, between students we had unofficial races on grades and on schools based on their scores.

IV. CONTEST CONFIGURATION AND RESULTS TRACKING

Our option was to establish the contest levels upon the student grades. For the contest management and tracking, the students were grouped in groups of 150 persons, each group belonging to the same school and their activity was tracked by a teacher from the very same educational institution. The teacher had the students in his group where he had a centralized view of the results. In order to facilitate activities documentation, the results were exported in Microsoft Excel format.

The scores are printed in the form of a web link in order to enable fast access to information. Teachers and students can see a leveled structure based view on domains, disciplines and instruments regarding the history of scores dynamic evolution. In our contest the students received a bonus of 20 points in the registration phase, the access to each lesson was paid with two points, refunded when the lessons were successfully learned. Otherwise the student loses the points while his score may decrease.

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| <input type="checkbox"/> | Gabriela Tania, Rizea | rizea.gabriela | ȘCOALA GIMNAZIALĂ "MIHAI | a.III-a | 363 puncte | 227 puncte | 2015-12-16 | 12. Dec 2015, 10:06 | Editati |

Figure 2. Student group view

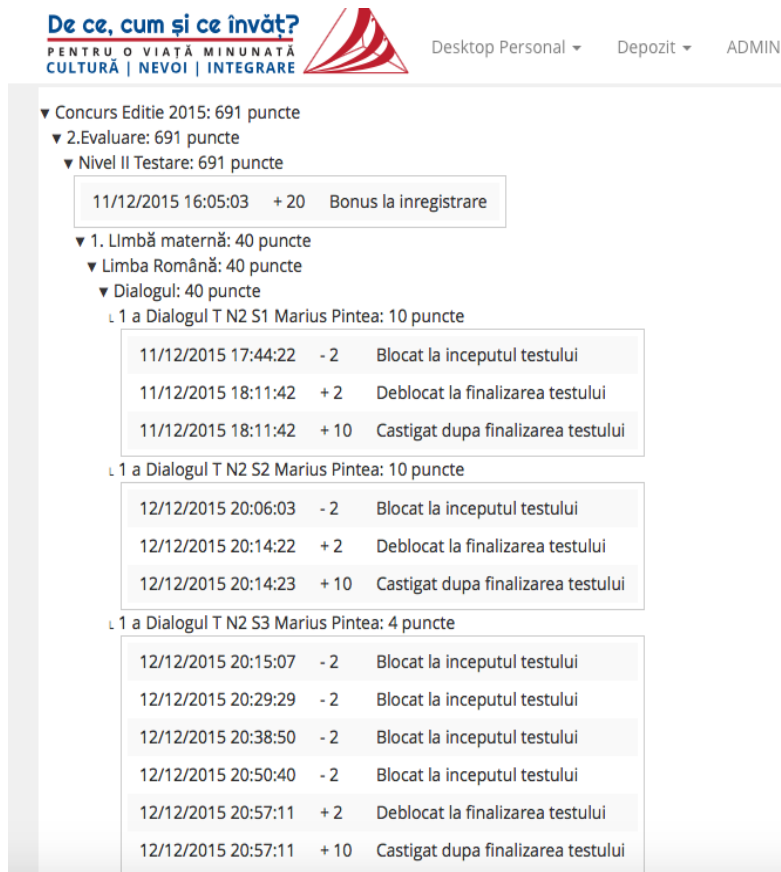


Figure 3. The scores

In order to see permanently the contest score, it is printed on the upper ribbon, separately on Learning and on Evaluation.



Figure 4. Learning level example

In the score balance obtained by the students is affected by point losses because of the not accessed unsolved exercises and also by the bonuses received at the beginning of the contest or when an invitation was accepted and the exercise was solved. In order to have a view of the implemented process aside from the scores received for solved exercises, on the website another score can be visualized, Contest Progress (see Figure 5) that keeps count of the points earned by individual effort exemplified in Figure 3. The contest progress points displayed in the Figure 1 menu cannot decrease; they show the progress inside the contest, which cannot be a negative number.

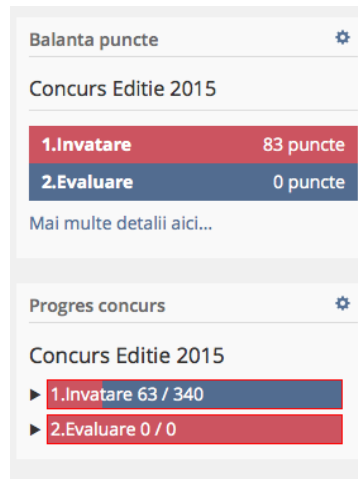


Figure 5. Balance and contest progress scores examples

For the implementation of a new contest session the access rights to levels, lessons and tests can be set independently. This is why the material organization possibilities are numerous in the context of new contest sessions.

4.1 Invitations sent by students

In order to increase the constructive interactions between students we enabled the possibility of sending invitations to friends to read a certain material if it was successfully solved (see Figure 6). The invitation receivers can select the desired ones by accepting them or rejecting the unwanted ones. In the case of accepted invitations the receiver gets a certain number of points. The invitations can be launched from the main user page as well as from the test webpage.

Figure 6. Invitation Example

4.2 Adaptive testing

In order to increase evaluation efficiency the order of the tests was changed such as their behaviour to be adaptive. From a pool of questions a subset of them are displayed randomly, then an adapter counter is increased in order to trigger an adaptive jump when certain conditions hold. For example, if during the time of responses to five questions the score is maintaining over 70% then the test is considered as taken and the points are credited to the student allowing him to jump on a next level. In the same way an activity can be ended if it is too difficult for the student.

4.3 The finals

In the contest there is a creation stage. The students were invited to create for five sections some videos, web pages, presentations, artistic materials, even poems. These materials were uploaded on the website and evaluated by a jury. Each member could see the materials prepared by the students,

without knowing their author and could give marks. At the end of the evaluation process the administrator could see and export the evaluation results.

V. RELATED WORKS

In [1,2,16] are presented dialog web game components for primary and middle schools students created in order to ameliorate students having weak performances. The created solution is an educational tool for competence development having gaming characteristics like: scores, levels expressed and planets in a solar system, dialogs sustained by state machines in the context of rich multimedia resources, etc. The current work is dedicated to a short term student contest.

In [3] is presented an application of generative learning objects to CS disciplines based on random numbers in order to generate content diversity and to motivate students to exercise in various setups.

[4] presents a framework to enable programming skills in Java for Android and to produce mobile phone games. In our work we consider gamification a way of motivating students to study and to improve their competences.

VI. CONCLUSIONS AND PERSPECTIVES

We can conclude that we created a dedicated online educational software platform based on principles inspired from Logan cultural levels [9] and the competence concept [17]. We consider this an original approach as far as we researched the state of the art. The approach was implemented in the context of a funded European project which has an important role in economy of the student contest: student prizes, teacher wages, software adaptation services fees, etc. The educational software tool used is based on the open source Ilias LMS [7]. The content was implemented by middle and high school teachers which had to switch from a traditionalist perspective to the project perspective and produce content in this new vision. The results of the project were found very good for the first student contest session where students obtained double scores than expected.

In spite of the fact that the project was based on European funding we designed the contest web application to be reused for other institutional practices or programmatic initiatives. There are no barriers to access learning and training maybe except the ones imposed by the direct resources necessary to generate a contest session like: financial prizes, organizing teacher fees, web hosting equipment, etc. The contest application software is available by e-mail request to the project manager.

Other contests could be generated in other languages for other countries, for different disciplines, with different learning goals so our approach integrates fully in the concept of open education.

As a perspective we consider to reuse the whole setup: software tool, educational content, educational management experience in other student contests. A different perspective is to add new educational content to the online platform and to involve more teachers to contribute and thus to support the approach. Another perspective is to make a deeper analysis of the obtained results and motivation assessment in order to identify factors that enable better student motivation. The result analysis may be enhanced by learning analytics or education data mining techniques and tools.

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