Can the Game-Based Learning Come?

Virtual Classroom in Higher Education of 21st Century

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Abstract—In recent years, the growing popularity of gamification in learning-organization has shown that it will become an integral part of both traditional and online education at different educational levels. Schools have begun to recognize the value of a successful gamification strategy in motivating students and stimulating the effectiveness of the learning process. The article presents a kind of game-based teaching-learning environment, a solution for integrating digital games into the learning-teaching process, linking theoretical and practical knowledge by the game through e-learning of accounting skills with special emphasis on the experiential learning method. The game-based virtual classroom presented in the present article has been working successful in higher education for several years, the number of the active students grown from semester to semester, the gamification becomes more and more popular in this level of the education, too.

Keywords—E-learning, experiential learning, gamification, gamification strategy, learning-management, gamified teaching-learning environment, gamified classroom, Learning Management Systems (LMSs), Moodle platform, pedagogical methods

1 Introduction

Nowadays, researchers, teachers and educational practitioners are increasingly turning their attention towards gamification: namely, the issue of using digital games in education, the impact of digital games on learning and teaching, and the effectiveness of game-based learning.

Since the 2000s, numerous studies have shown the learning potential of digital games [13, 15, 4, 14], the number of educational games has increased, and varied games appeared in the educational palette. Most games can comply with the basic requirements of the specific learning environment, moreover, they support, even guide the teaching and learning process in many cases. However, they are only able to contribute to effective learning if we manage to solve the integration of the games, the educational methods, the game design and the content (curriculum to be learned).

In the last few years, an increasing interest in the theme is observable in the national school system. There are need and willingness to use learning games at all levels of education - from primary and secondary schools to colleges and universities. More and more practitioners rely on gamification both in the traditional face-to-face teaching and in the computerized, internet- supported education.

This study presents a game-based teaching-learning environment, a kind of solution to integrate digital games into the learning-teaching process and to show the chances of better linking theoretical and practical knowledge through games.

"Digital gaming" as a concept can be applied to many types of games - action games, adventure games, simulation games, sports games, strategy games, puzzle games - it is possible to categorise the games based on many factors such as content, type of goals, style, or interactivity.

In this study, I analyse exclusively the possibilities, role and effectiveness of educational digital games in school education through the example of e-learning in accounting. I point out that the constant advancement in technology, the use of digital games for educational purposes are redefining the education: games are creating communities of students, the simulation and strategy games can transform students into a community.

Students can move and act freely in the teaching-learning environment created through games, while developing their problem-solving abilities, commitment to learning and motivation to continue learning. The games help to exploit the values of constructive pedagogy: they contribute to the cognitive knowledge building (perception, understanding, opinion forming, drawing conclusions), help to develop higher cognitive skills, strategic thinking, group decision-making, support to create a realistic and diverse learning environment.

In addition, it is important to note that the potential of digital games, "scientific game", can only be realized if we are able to accept games as educational tools, if we can resolve the tension between the game and the learning objectives, solve the problem of transferring knowledge acquired through game-based learning to the real world.

2 What is The Good Game Like? Are There Good and Motivating Games to be Used? Features of The Educational Games

The choice of using digital games is offered when planning the educational process, when the goals and subject requirements are selected, the mode of assessment is defined, and the curriculum is analysed and structured.

Whatever game we choose to convey certain specific knowledge, we must place emphasis on the unity of content, skills and attitudes, competency-based education, and multi-directional competence development, so the methodology educational must focus on the learner profile [11].

Educational games are effective if they have a primary purpose of acquiring knowledge and entertainment is a secondary purpose, only [10]. These games, for

lifelong learning point of view, are able to transfer knowledge, to develop students' professional competence, personal, social and learning competence, ability to adapt to different situations, while the secondary objective - the entertainment, "let's make learning fun' - also fulfils. The games with lots of graphics and virtual worlds, need to create an attractive, motivating, innovative learning environment for the learner, where the learner's curiosity and discovery desire is the driving force of learning-teaching process.

Games built into the teaching-learning process are not games in the traditional sense but opened options: students can take the desired or expected knowledge in a variety of ways; they can move freely along the learning paths without any external constraints. The interaction between themselves will allow to communicate each other, exchange views and cooperate in the learning process. For educational purposes, games that are designed not only for individual learning but also for group learning are most effective. The purpose of education is to prepare students for work in the community, and so the games built into the educational process are expected to create situations in which students learn special communication, generate professional discussions, construct arguments and strategies facing each other [9].

Transmitted by the games, learning material must always provide learning experience (learner experience), the game must be a model reflecting the practice and culture of the related topic, interacting with the real-world model while personal, social and knowledge competence develop.

My aims, when designing games for teaching accounting skills have primarily been to develop 'practical knowledge' and 'talent for something' competencies. The main purpose of the games is to help students learn the way in which the profession or practice community thinks and works. So, during the play, I focused on the action-based learning method, the problem-based teaching-learning method. My goal was to create games that would help students' mindsets to be practical, to imagine the economic environment in which they would work after the schoolyears.

Also, when designing games, the idea was that if learning was fun, it would encourage students to spend a significant amount of their free time on learning to acquire as much knowledge freely as they could, while revealing "talent", the "aptitude" of innate abilities and inclinations, the development of which is the task of education. It is the educator's responsibility to help the emergence of 'talent' through consciously designed teaching methodology and the development of individual learning plans, to assist students in their talent management and development.

3   Learning by Doing – Let's Play The Learning Material

What is experiential learning? The university students typically spend long hours taking notes in lectures or immersing in readings from week to week. At the same time, will the students be able to recall the knowledge gained in this way, will they be able to select in the huge body of knowledge, and will be able to apply their knowledge credibly when it will need?

To face this problem is one of the major tasks of education. We must create a learning environment in which the opportunity is offered for students not just simply to try to absorb a small portion of the mysteriously endless world of knowledge, but to experience it, to feel it in different life situations: in community, simulated environment, virtual classroom. We must bring real life situations into the classroom, and we have to coordinate theory and practice, because it is what really needed to consolidate understanding [1].

The Accounting courses I developed in the context of theoretical knowledge and practice attract more and more students, including participants of Erasmus-programmes and proved to be a workable solution. The experiential learning supported by games is an effective way to bring the school and working environment closer together. Experiential learning enhances students' motivation and commitment to learn, facilitates the discovery of the relationship between theory and practice, contributes to better understanding of working cultures, and helps to set and achieve career goals. Through the gamified courses, students may easier acquire the targeted professional skills and attitudes. They will become sufficiently confident, think critically, communicate responsibly, work in teams, communities and be able for self-managing and to see themselves through employers' eyes, as well.

The feedbacks received from employers and the accounting profession have confirmed that the students graduated at the courses can understand and accomplish tasks faster than other junior employees. This must be due to the benefits of experiential learning. It enhances diversity, employee activity and enthusiasm within the workplace, broadens community's opportunities, represents a new perspective in the development of programs and services, helps the organizations finding solutions to specific business needs and attracts motivated and enthusiastic new staffing members.

Also, the feedback confirms that it is strongly recommended to review the opportunities for experiential learning during the methodological planning of a course and if possible, take its benefits. Let's think for example, of what it would be like to train financial advisors without understanding the customer's behavioural culture and reactions. Or, let's imagine what it would be like to oblige a junior employee to make an accounting balance sheet without having experiences in such type of work as part of the formal education?

I believe that college and university study programs can help students achieve their career goals by providing training that helps students to discover their talents and their 'abilities in something' by learning about the working environment and culture one has once to face. And therefore, we need to take on the stage the learning material.

4 What Determines The Success of The Educational Games?

The success of games used for learning depends on many factors: Some educational experts think that using problem-based games will be the most suitable way of the effective education. They emphasize that the power of the motivation to solve a problem and then seeing the successful solution will encourage participants the most for further learning [8]. Others offer to apply the most extensive use of interactive game-

design techniques [22]. They believe that the motivation power is in the variety of games, so they can increase the students' commitment in learning to the greatest extent. The above thoughts suggest that the game should contain as many incentives as possible - student freedom, different learning paths, immediate feedback and rewards - as this is the only way to accomplish the educational purposes we have set, or even to accomplish few specific missions.

We need to see that the goal is the same in both cases: involving students in shaping the teaching-learning process. This requires a paradigm shift: the teacher should be different to a traditional lecturer, she/he must step out of the stage and actively monitor students' activities, their progress in the learning process and, if necessary, have to intervene with supporting questions to activate the lower status students [18].

Also, in a gamified teaching-learning environment, there is a need to change the way of assessing students' performance: the progress in learning needs to be immediately and continuously assessed, "acknowledged" and rewarded. Digital games appreciate usually the performance with coins, badges, scoring ...., but easily, in addition to that, we can develop our own, unique rewards to stimulate learning.

In the field of accounting, "reward games" built in the e-learning process, have proven to be most effective in stimulating learning. Reward can be a surprising lesson (e.g. a short animation with spectacular effects presenting specific realistic situations which conveys the knowledge through gamified teaching-learning environment), acknowledging achievement of specific learning milestones. Based on the students' feedback, these surprise-creating, "I didn't expect it" playful techniques are highly motivating. It has been proven that playing is a powerful context for learning, enabling the creation of gamified teaching-learning environment in which an unusual, new, previously unknown thing is created, which arouses the interest and curiosity of the learners, thus stimulating the acquisition of new knowledge.

The integration of digital games, 'playful rewards' into the curriculum, the learning-management in the virtual space, also presents new opportunities and challenges for the educator, as there are many technical and technological problems in the learning-content development that may limit applying of the games in the virtual space.

E.g. the software we want to use to create the game may not be integrated into our teaching-learning environment. So, at the planning phase of the e-learning process, it is important to examine the compatibility of the teaching-learning space with the standards, game software and specifications. Thus, we have to choose which standards, specifications we want to use to store the data and whether the gamified environment is appropriate.

5　Is it a Pedagogical Challenge Applying of The Digital Games in The Curriculum?

The use of digital games in education, despite its many benefits, is rather limited. On one hand, one of the main reasons is a lack of acceptance of games as educational tool among the majority of educators. There are educators who perceive the use of games as a leisure time activity with no pedagogic value [7, 20], and there are teach-

ers who question the motivational power of educational games against the leisure games [21].

It is fact, that playing in an informal (leisure) situation - for example play time, play mode, deciding about playing - is not the same as playing in a formal (school) environment. So, if we decide to use digital games in our curriculum, we have to see the most essential difference between the above two kinds of playing, that is the goal of the game.

The main purpose of informal games is that the player may have fun, these games usually focus not on teaching-learning goals. At the same time, the main and definite aim of the educational games is that students ('player') can learn different subjects in an easier way. Nevertheless, the playing effects used may be as enjoyable as in the most exiting informal games. Educational games are part of a learning scenario and the major added value of the process is that learning does not end when the game is over. The experiences acquired will make students satisfied and encourages them to learn more and more.

Integrating digital games into learning can be effective if the game is able to create a real-life learning environment, approach the problems realistically by exploring the relationships and providing varied representations of reality and activating students' thinking in different situations. The design of the game should be tailored to the learning content, the learning and teaching objectives pursued, and should focus on developing the competences (knowledge, skills, autonomy and responsibility) defined by the curriculum, taking into account different learning styles. Teachers can facilitate the understanding of content and transfer of the skills through pre- and post-game discussions, helping students to truly join the game and properly connect and compare the gamified teaching-learning environment and the reality, the real world [5].

All these tasks are challenges for the teachers, as in a new kind of learning environment they have to meet the expectations of the students: they must gain their respect and their attention but above all, they must reach, that the students accept them as mediators of the knowledge and the values.

6 Let's Play Accounting

6.1 The content of the games and the motivation

I started to use games to teach some of the topics of accounting that required extensive professional knowledge. I wanted to achieve that games with all elements of them focus on the real problems, raising interest and arousing ideas, which will lead to the solution of the problem. The aim was that the experiences gained through the gamified teaching-learning environment turn into ideas that will inspire students to acquire new experiences and thus will be more motivated in further learning.

So, to teach some important parts of the accounting, I prepared learning materials combined with gamified environment: I planned the scene of the game, the characters for modelling a real problem. To compile the accounting balance sheet document, I envisioned the company, the economic operators, managements, business partners in

gamified environment, and the accountant under whose leadership the balance sheet document was prepared. The game is available in Accounting Basics E-Book [16].

When designing the learning materials, it was an important criterion that students will really experience the problem, that they are able to identify with the goals and task represented by the game, the task to be a challenge for them, to feel responsibility and obligation to solve the task. On the other hand, the goal was to incorporate feed-backs, reinforcements and rewards into the game to improve motivation. For this reason, launching of the game is conditioned: e.g. it can only be opened with a password and the password becomes known by solving a crossword puzzle. I represent this element in Figure 1. [16].

Fig. 1. The way to achieve the tale in the Accounting Basics E-Book

Years ago, I created the games with Adobe Flash software, the professional multi-media development software from the Adobe Systems family, so to play them we need Flash Player. Today, this software is not compatible with the different browsers and operating systems, instead, many tools developed for Learning Management Systems are available, which support development of games, web applications, animations and mobile content. The LMSs can manage for example the Office Mix application, (to enrich the Power Point presentations with audio, video, games) so we can model content, quickly create animations, simulation games, interactive tasks, create exciting e-learning practises and videos. I represent a kind of accounting model in Figure 2 [16].
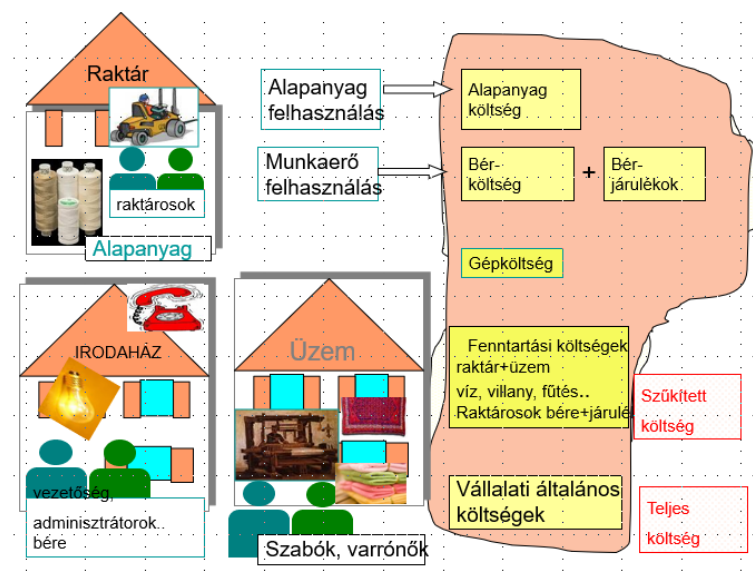
Fig. 2. Model of the Self-Cost Accounting, in Accounting Basics eBook

In LMS systems their central repository includes all syllabuses, content (e-Book), practice exercises (self-assessment tests and exam tasks with instant evaluation), forum, internal mail system, user-to-user communication in closed learning-teaching space. It is a significant benefit of LMS that it automatically adjusts the elements of an e-learning course from text to images, it can be customized as needed, the position of the elements can be varied, it can be used to create demanding, attractive learning environment.

6.2 The teaching - learning environment

In designing educational games for the accounting skills, it was an important consideration to create an educational environment by choosing an LMS e-learning platform, that is able to continuously monitor student activities by raising, solving and controlling of different problems, that supports individual learning, learning in community, the cooperative knowledge building, that helps to measure, evaluate and recognize student performance and to compare student performance with one another.

To develop the teaching - learning environment, I chose Moodle (Modular Object-Oriented Dynamic Learning Environment) open-source freeware software, which is freely usable under a GPL license, so it can be customized with own, individual development and idea [19]. When choosing a framework, besides ensuring student liaison, it was an important consideration that it supports the production of e-books (with text, graphics, spreadsheets, images, sound and video), compatible with the SCORM (Sharable Content Object Reference Model) standard, by which well structured, spectacular educational materials can prepared. We can see an Accounting eBook developed by the SCORM standard in Figure 3 [16]
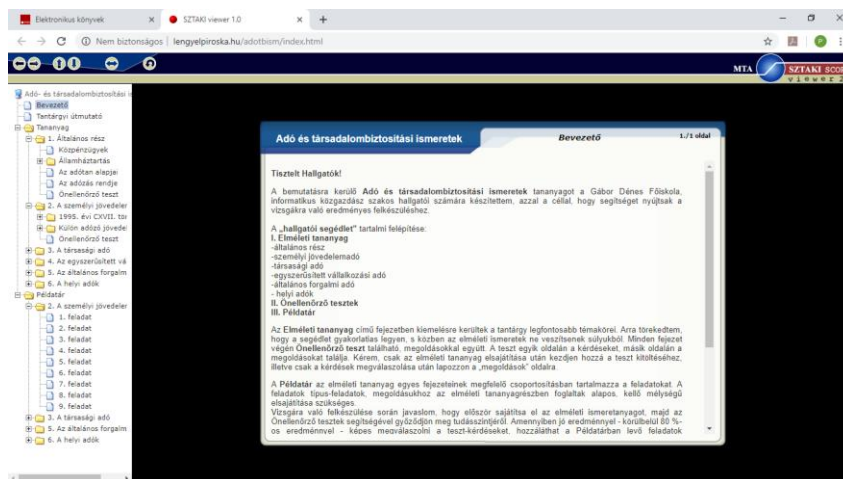
Fig. 3. Accounting E-Book by SCORM software

The main reason for the choice of Moodle was to have an e-teaching-learning environment where teacher-student communication can be implemented in the same way as in traditional classrooms. Let's imagine the virtual classroom where the instructor gives lectures, presents models of learning content, organises formal and informal exams, controls preparing of the project tasks, invites the students on games, communicates students, makes reports on student's performance. Well, the Moodle allows this type of learning management by integrating virtual classrooms (e.g. WiziQ) which can support communication between learners and teachers in a unique way.

The virtual classroom is a state-of-the-art digital tool which is filled with content created by teachers and students. It is to be noted that the effectiveness of teaching and learning will depend on the creativity capacities of participants, as well. The classroom is available space for real-time teaching lessons, lectures, consultations, formative or summative exams, or even conferences or parent meetings. During classroom lessons organized by the teacher, participants can ask each other, the teacher and solve tasks individually and in groups during the lesson.

The basic function of virtual classrooms is that it can automatically store all teaching and learning materials, including real-time teaching lessons, so these lessons can be retrieved and broadcast at any time, helping students who were not able to attend real-time lessons. We can see an element of accounting lesson in virtual classroom in Figure 4.
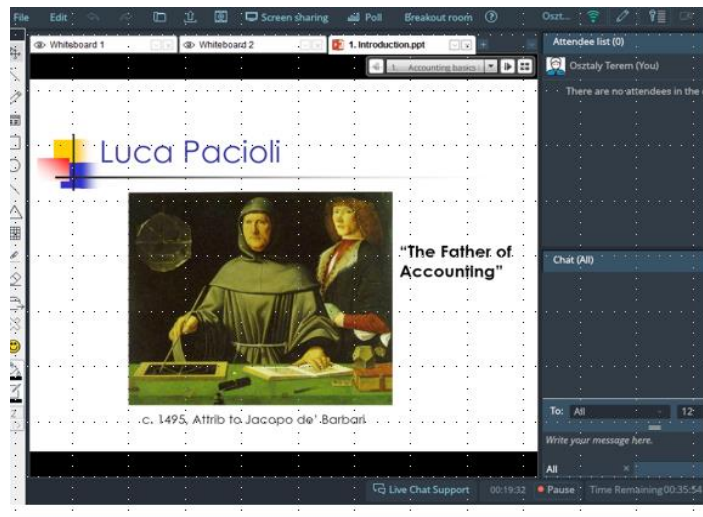
Fig. 4. Accounting lesson in virtual classroom

6.3 Games in the performance – Measurement

An essential part of a well-designed digital game is the use of automatic measurement and evaluation processes [12]. The educational games in virtual environment measure the students' performance on "natural way": we get instant feedback on the student's existing knowledge, the effectiveness or shortcomings of the learning, and the quantity of time spent on study. Through the game world, we can observe students' abilities, the active application of concepts and acquired knowledge in a new situation, but the most important novelty is the opportunity to observe when students' thinking becomes visible, where they are in mental development, what is important that we can design a personalized pedagogical intervention [2]. The motivation level of learners becomes measurable, differences of students' characters, learning strategies and styles are followed. That is a basic requirement for the intensive development of skills and the selection of effective methods for knowledge transfer. It is very important to take into account the individual abilities of the students, as not all students can be taught the same content in the same way. An educational game that can be tailored to learning style, expandable with multiple learning paths, gives the learner freedom of choice, which is a prerequisite for learning success.

All the above considerations suggest that the challenge to apply educational games to develop performance measurement, a performance measurement system and incentives based on it is not an easy task. To sense the problem, it is enough to mention that students may move forward differently in the game, in the learning process, they will go to the next level or try again from scratch, start on a learning path and then choose another path. It is important to decide what we consider to be the performance of each student and to what extent (how to be recognized the success or failure of the first, second or third attempts), because this is the only way to make learning outcomes

comparable. In this process, multi-dimensional information gathering is necessary and rewarding the level of knowledge and competences acquired, must be carefully planned with a specific attention to the value of recognitions embedded in educational games, such as medal, badge, leader board, points.

The motivational power of the reward embedded in educational games is proven [3,14]: it encourages students to move forward to perform the most they are able to do. Therefore, 'the stealth assessment' method must be embedded in educational games. What does it mean? To measure the level of knowledge, students must be given "tasks" that draw attention to play instead of the "exam". Thus, the student will experience performance measurement not as an "exam" and so will be unchained and liberated and it will increase the likelihood to solve the assignment successfully. Therefore, it is highly needed to develop a reward system that on one hand motivates the students, on the other hand provides to teacher with the relevant performance evaluation.

The Self-developed Accounting Educational Practice eBook that was made with SCORM standard provides instant feedback on students' performance after completing assignments thanks to built-in measurement process. E.g. if an answer to a question is appropriate, the message "Solution is correct" will be displayed, giving the students positive feedback. If the answer is wrong, the message "Solution is incorrect, try again" is displayed and students will be supported by additional problem-oriented questions to try again. If the second attempt is unsuccessful too, the student will be given another opportunity to complete the exercise by explanation of the knowledge, so with newer help. In the case of a third unsuccessful try, the software suggests the student to review the theoretical knowledge thematically and then try to solve the exercise again. By choosing the 'Backtrack' option, students could try to solve the task as many times as they wanted. The software does not recommend stepping the next level until the solution is incorrect. The Figure 5 shows a segment of the algorithm from Accounting Educational Practice eBook made by SCORM standard [17].
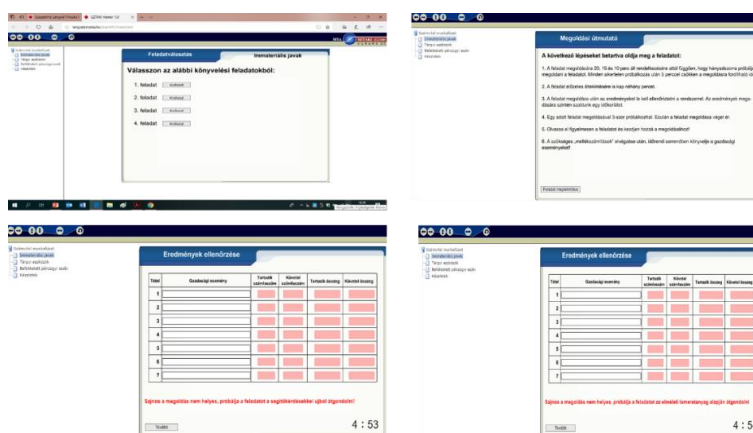

Fig. 5. Accounting Educational Practice eBook made by SCORM standard

Today, when the digitalization permeates almost the entire education system, there are many tools available to make automated, customized performance-evaluation games in relatively simple and fast ways. We can create high-quality tasks using Hot-Potatoes6 software, such as crossword puzzles, word puzzles or quiz games, that can be integrated into the Moodle framework, complementing and diversifying Moodle's own task creation program.

Professional high-quality games can be developed by Quandary software, an application for creating web-based action labyrinths. We can use the software to create interactive tasks that offer a variety of options to address a specific problem. By selecting one of the options, the resulting situation puts the student in the position of another option, thereby placing student in an action labyrinth.

The labyrinths of action can be used very effectively to solve a given problem in a variety of paths, considering the individual learning attitudes, that I have been able to utilize in the accounting curriculum. The Figure 6 shows game-based tests made by Quandary software [16].
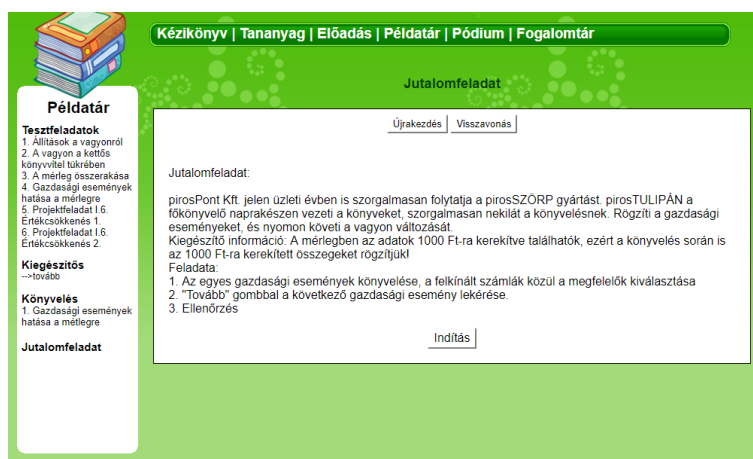

Fig. 6. Accounting test with support of Quandary software

7 Conclusion

In this study, I explored the possibilities and limitations of using digital games, the technological and pedagogical-methodological possibilities of combining learning with games ("how learning can become a game") through the example of electronic learning management of Accounting courses. It does not mean a complete redefinition of the methodology of accounting education, but to point out that the widespread use of ICT brought major chances and one should make use of that to the extent possible in the field of science, including the education.

It is not about suggesting that the age of traditional education (classroom, books, lectures, homework) would be totally over, but the challenge and opportunity to use digital games and gamified classrooms will be increasing. In this way, we should in-

tegrate the means and tools provided by the digital/virtual world into the education as systematically as possible and think about how these phenomena will further influence to current trends and practices of education.

Specifically, in order to rely the advantages offered by the digital games and game-based learning to an optimal extent, both teachers and students need to accept games, including digital ones, as educational tools. We have to believe that any content – be it law, sociology, history, chemistry, military-technical knowledge etc. – can be transferred effectively through the support of educational games, that game-based learning can be an effective method to train professionals to accumulate effective knowledge and attitudes that the society expects.

In virtual classroom, the educator's work will become much more significant and they must have very special attitudes to design the teaching-learning process. The teaching-learning environment should be a living environment where students acquire advanced professional skills, where they learn how to study, play, work independently, live in community, collaborate with others and think together. Between available advanced ICT tools, we will surely find the appropriate tools to realize the planned teaching-learning environment.

And if all this is so, then "game-based learning" can come.

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