

ISCKMC 2020**International Scientific Congress «KNOWLEDGE, MAN AND CIVILIZATION»****TESTING BASED ON GAMIFICATION OF IT CLASSES**

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Abstract

Modern society is faced with a need to highlight information education aiming to develop students' ability to use digital devices, information and communication technology and critical thinking for self-empowerment, artistic freedom, personal and public welfare, safe and ethical activities in the information society, ability to create, retrieve, process and exchange information in working and private life. The above challenge is addressed within school education in IT classes with its instability, rapid changes in teaching materials, advances in hardware and software, and, with the computer to become a basic tool for teaching. The paper is devoted to testing used in IT classes, which has a number of advantages. Besides being used to monitor students' level of mastery within a given discipline it can perform an educational function when a student, through training tests, rethinks learning material, based on the errors detected. Tests for evaluating student progress in IT classes will be effective provided that: – assignments or questions correspond to objectives stated or teaching materials within a given discipline; – instructions are clear for all students; – lots of variations of questions to avoid exchanging answers among students of the same group; – constant updates of a pool of questions in accordance with IT recent trends; – taking tests will not cause anxiety among students, which is possible provided that tasks are immersed in a gamified learning environment that is constructed on the basis of advanced teaching methods and subject to settings interesting for children and adolescents.

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1. Introduction

Informatization is currently affecting all spheres of society. This initiates constant updates of educational systems, including those associated with the development of competences in the field of computer science and information and communication technology among students of comprehensive schools. In the light of hyperinformatized life of children and adolescents, it is necessary to make sure they are safe in studying IT (Batan, 2011; Kuchma, 2017). This requires teachers in this academic discipline to use the most effective methods and techniques for organizing training focused on personal student development (Duplensky & Gibadullina, 2018).

Yet, there is an unresolved issue of how to assess students' learning achievements in IT, encouraged by emphasis on the development of applied skills. In addition, the basic concepts, requirements, principles and standards inherent in the use of these assessments in IT lessons have not been clarified so far (Esin, 2001).

Testing is one of alternative methods for measuring knowledge, supported at the state level. It can be useful for an experienced teacher, subject to a conscious approach to testing due through standardized methods, adherence to some basic procedural requirements for conducting, processing and analyzing the results obtained. Therefore, using it as a key means to provide continuous and final assessments in information technology at comprehensive schools is very relevant.

Doing a test, learners get aware of the purpose of assessment procedure, which causes them to feel stressed. This can distort the indicators showing a true level of diagnosed knowledge. However, testing in a gamified environment can not only decrease the level of anxiety in students, but also creates positive emotions encouraging them to study a discipline. It takes teachers quite a lot of time to create such a diagnostic tool, but in the conditions of booming gamification in education, the prerequisites arise to call for creative teams of teachers address this challenge.

2. Problem Statement

The study is aimed at the following objectives:

1. To deal with the features of a proposed assessment tool.
2. To identify strengths and weaknesses of learning assessment in IT classes at comprehensive schools.
3. To determine advantages and disadvantages of using tests hidden in game activities in IT classes.

3. Research Questions

Testing is a modern method of diagnosing students' knowledge (preliminary, thematic, final). However, just like any other form of knowledge assessment, it arouses in students fear for possible results, which leads to attempts to fake them by learners. Modern pedagogy seeks to find optimal ways not only for teaching, but also for an objective diagnosis of knowledge gained by learners. Therefore, the

tests hidden in a gamified learning environment can help teachers indirectly obtain necessary data on the quality of student learning.

4. Purpose of the Study

The study aims to determine a specific character of testing used for organizing a gamified environment in IT classes.

5. Research Methods

The study examines the problem of improving the use of tests in IT classes based on a subjective approach that provides considerations applied to the object of study through the prism of narrowly focused ideas. Theoretical and empirical research was based on the typology of assessment tools by Emelyanova et al. (2019) who propose to align assessment methods with intellectual or activity criteria and to fall them into reproductive, productive, active and interactive groups.

6. Findings

Test assignments allow short-time evaluations of large amount of learning material acquired, quick diagnosis of students' mastery within a specified knowledge domain, and overall achievement level. Tests can be constructed so as to measure the level of logical, problematic, critical, combinatorial, visual thinking of students and monitor the level of their knowledge. The quality of all above forms of testing can be evaluated based on a verified system of test assignments, a standardized assessment procedure, and a predesigned technology for processing and analyzing the results. In addition, the efficacy (validity), objectivity and reliability of their results are important criteria for diagnostic tests measuring student attainment level (Shikhova, 2004; Schwartzman, 2009).

In general terms, validity of an assessment means what it is intended to measure and how well it does it. This characteristic reflects the degree of confidence that test items cover the content of a particular area of knowledge as fully as possible, accurately determine the skills essential for this activity, but do not assess the auxiliary ones.

The factors that reduce validity include the following: assignment or question does not correspond to objectives stated or the content of a discipline, are incorrectly articulated or arranged, the lack of complete and clearly defined marking instructions, non-compliance with time requirements, violations of assessment procedure (Shikhova, 2004).

Reliability lies in the fact that performance on a test is comparable on two or more separate occasions. Reliability relates to the consistency and accuracy of the results. A test is considered reliable when two of its equivalent options, with the same cohort of students, show a high correlation (Kochukova et al., 2009).

Objectivity implies well-defined tasks in compliance with age-related capabilities.

The main requirements for test construction remain the following (Kochukova et al., 2009):

1. Tasks should vary in content and form: this avoids monotony and provides sustainable motivation. The use of closed-note and open-note tests contributes to the expression of students' own opinion without restrictions.
2. Formulate test questions in the affirmative with maximum precision and unambiguity.
3. The number of test items for middle school students should be from 20–30, high school – 35–40. The number of items in a test should be such that no more than 5 % of class students can complete the test.

The advantages of testing are:

- high processibility, ensuring the development, implementation and calculation of results using computer technology, and with no technical means available, the ease of counting correct answers is provided by templates (keys) and other devices, thus saving the teacher's time;
- establishing rapid feedback with students and determining the level of mastery allow for appropriate alignment in further learning;
- objectivity of assessment that warns against bias and ensures equal conditions for all educational agents during testing;
- simplicity of testing procedure and handling of the results obtained;
- use of quantitative indicators to determine the level of mastery;
- clarity and unambiguity of problem statements, which ensures equal perception;
- simultaneous assessment of all students in the class;
- efficient use of class time;
- promotion of student self-empowerment and interest in a given course.

One of the drawbacks of modern assessments is that the results indicate a major trend rather than a causal relationship, allow for the result rather than the way it is achieved. Nor they adequately reflect interest in a discipline. It takes a significant amount of time to create an effective standardized test.

Using different test constructors requires from teachers certain computer literacy and time to construct a test. But the time spent will more than pay off once the test is used repeatedly. The computer makes it possible to submit a question and responses in a different order, which provides a multivariate test. That is, the cohort of students being assessed can be infinite. Modifying programs, teachers alter, delete or add only some tasks, which also saves a lot of time.

A disadvantage of tests created with test constructors is that they can only be started by the program in which they were constructed. In this regard, online test constructors are increasingly popular.

The advantages include an increased number of test takers and the ability to take a test at any convenient time, take it as homework or in addition to lessons, even at the end of a lesson, subject to free access to the Internet (Bochkarev, 2018). Confirmation of passing a test and obtaining test results can be an attestation of participation, which is issued after saving the evaluation results.

TestW and MyTest are software multifunctional and convenient not only for teachers, but also for students. Every year the versions of these constructors are updated and it is not always possible to use pre-compiled tests. Provided that a teacher has his/her own website or blog, perhaps the best alternative for placing tests on their pages are tests created online. Such tests can be opened by any browser online following a link.

In a modern web space, there are a lot of free online test constructors enabling various assessment formats. Everyone chooses what is convenient for them personally. The first tests written in a programming language can be considered as a gold standard of computer tests. It is clear that in order to compile such tests, one had to have at least basic knowledge of such languages. And now teachers are offered a wide range of test construction services. Let's dwell on one of them. It is a free OnLine Test Pad portal. To get a full access to construction services, you merely need to sign up. Once registered, you will find yourself in your personal account, where a convenient interface will help you compose not only tests, but also crosswords, polls and logic games. References are presented in an understandable form for any user. If something is not clear, consultants will always answer questions. It is possible to save the created tests in electronic form and print them.

An online test created on this portal can be educational. An incorrect answer can be commented on; theoretical material or an indication of where to find an explanation for this question may pop up below. The table of results is generated depending on the scale: in percentage, number of points and textual assessment. The test time may be limited. Access is random or by code or specified access time.

In their personal accounts, teachers can view students test results, even if they did it at home. Students will receive attestations of participation, which confirms that they have passed a specific test. It indicates the name of a test, the result and completion date. If possible, this document is printed and stored electronically.

Another significant disadvantage of testing is the possibility to guess a correct answer without having the knowledge required. To solve this problem, it is recommended to use descriptors (wrong answer), selecting them so that they are plausible, necessarily on the topic tested, and have the correct answer in order to reduce the degree of guessing.

The main disadvantage of testing is deemed to be the fear of students taking a test for its result. Therefore, it is necessary to use a latent form of testing that involves encrypting test items in a game, when learners do not realize that playing a game they have the learning outcomes achieved in a given discipline measured.

Due to a specific character of IT as a school subject, testing procedures to measure learning achievements in this subject have a number of features (Pugachev & Gazenaur, 2009). It is easier to organize it in an electronic educational environment due to a predetermined use of computer technology in classroom settings (Nikulina, 2007). Test items that inextricably intertwine theoretical material and various tasks make it possible to evaluate not only students' mastery of computing techniques, but also their ability to think, which, basically, is the wider objective of teaching IT at school (Gadzhiev & Mirzoeva, 2016; Rogozhkina, 2012). Combined with game activities of students, testing in IT classes will also perform an ampliative function (Zlatopolsky, 2015). Game-based learning has a large motivational capacity, as opposed to other types of learning (Kloktunova et al., 2019).

Let us consider the use of gamified environment for learning programming, through a code language as an example, in comprehensive school. The materials of the Hour of Code project and the techniques applied differ significantly from those that have long been used in IT classes. The exercises are designed in such a way that they could present basic algorithmic constructions in a format close to a gamified environment during 1:00 using the Blockly visual environment. On the screen, learners can see

instructions provided for play-based tasks, a labyrinth with game characters and commands that they can perform. Learners need to correctly assemble blocks in a workspace and run a program. An incorrect or ineffective answer will be followed by a corresponding prompt to pop up.

All blocks composing visual environment can be viewed in a code mode (Averbukh et al., 2020). Each student works through the content and performs exercises offline, the teacher's role is to solve technical problems and assist learners in too complicated tasks. With each step, tasks become more and more complicated, students sequentially get acquainted with such constructions as cycle with parameter, loop with condition (prerequisite), complete and partial branch, simple programs aimed at passing mazes of varying complexity.

Doing exercises, students fill out their own online achievement cards. For successful completion of assignments, students do not receive grades or points, but distinctions, trophies, which reflects one of the trends, otherwise known as digital badges, to visualize the knowledge and skills gained.

For over twenty years, in many countries, teachers have successfully used role-playing games and quest technologies not only in organizing extracurricular activities, but also for conducting lessons. With that, a teacher is challenged to develop a script, with a storyline that will fit not only learning objectives, but age interests of students, as well. This quest should contain hidden test tasks of a productive nature that, once correctly solved, will allow players to progress to the next level. Game-level completion can be either individual or group.

A web quest is of particular interest. Initially, this method was used to organize creative and search student activities but based on the objectives set by IT as an academic area, this method can be used not only for teaching, but also for quantifying level of attainment or competence. However, as the researchers note, this method is the least in demand due to teachers' ill-preparedness for digitalized testing (Emelyanova et al., 2019). In order to create a high-quality gamified environment, a teacher must have special skills in the field of programming and spend a lot of time creating it. Therefore, it is advisable to organize creative teams of teachers in order to develop gamified diagnostic resources.

7. Conclusion

At the moment, testing is the most common form of measuring the growth and effectiveness of students' knowledge acquisition at all levels of education. The main reasons for this prevalence are:

- a high degree of objectivity compared to other assessment methods, but subject to the validity of the diagnostic material;
- wide outreach to students due to mass testing capabilities;
- possibility to organize an independent assessment of students' achievement levels in the context of network interaction between educational institutions.

Testing in IT classes will be effective if:

- tests tasks or questions correspond to the purpose of testing or teaching materials within a given academic discipline, which is possible provided that test materials are designed by teachers who provide learning in IT, based on equipment available for conducting lessons in a particular education institution;

- teachers will take into account material and cultural background of students' families, which provide different financial capacity for using a computer for homework and preparation for assessments;
- problem-statements are clear to all students, instructions are detailed enough for taking a test;
- a high degree of variability of test items provided for generating question pools for individual use;
- constant updates of a pool of questions in accordance with IT recent trends, which is due to high rates of IT development;
- passing a test will be immersed in a gamified learning environment with modern and interesting settings for learners, which will inevitably reduce the level of anxiety.

Testing conducted in a gamified environment not only encourages students to study IT as academic discipline, but also creates enabling conditions for improving students' skills outside the classroom. However, creating such forms of testing requires teachers not only to have special skills, but also to spend a lot of time.

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