ONE WAY TO ELIMINATE AN EDUCATIONAL SYSTEM DEFECT

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***Abstract**: An inborn defect of the modern system of school education is analysed, being that students systematically pass to studying of a new material, without having acquired to the right degree the previous material. Properties of digital learning objects, which provide assimilation of a training material by students are described. The properties are based on semantic interaction use to reach pedagogical goals. The method of the flipped classroom which provides incorporation of individual activity of students with digital objects into educational process is described.*

***Keywords**: educational system, learning process, teaching process, digital learning objects, interaction, flipped classroom*

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Introduction

Why at the modern school existing already more than 500 years, not all students acquire completely that knowledge and don't gain ability which are assumed obligatory for the young citizens who are starting out? Why this defect isn't eliminated, though it 500 years how it is known? What prevents any national education system to liquidate this defect? It is necessary to understand.

Pedagogical aspect

For this purpose it is necessary to consider in detail after authors [Pisarev, 2011] a single cycle of training. Let's begin with the first link of this cycle – the learning.

1. Training material (TM) preparation on the basis of the educational program - (teacher);
2. TM presentation and the work organization with it - (teacher);
3. TM perception, memorizing, understanding and work with it - (students);
4. The organization of activity of students on production of an learning product (LP) - (teacher);
5. LP production on the basis of TM delivered - (students);
6. LP processing (an analysis and an assessment) - (teacher).

Authors call this link the learning as actions of items 3 and 5 are carried out by students independently, without the assistance of the teacher, on the basis of own abilities and the reached level of development.

Types of educational activity of the learning link correlate well enough with school reality. TM preparation (item 1) is carried out by the teacher during preparation for a lesson. Kinds of activity of items 2, 3 and 4 are carried out during a lesson in a class. Item 5 – homework performance, and – item 6 – check of the homework at the beginning of the following lesson.

LP processing can have three outcomes:

1. The result of performance of a task – student LP corresponds to a standard. It means that it is enough abilities of the student for full TM mastering without additional adjustments which the teacher could offer.

2. The result of performance of a task – student LP doesn't correspond to the standard. In this connection the teacher carries out the second link of a cycle – teaching which is intended for correction of shortcomings of TM mastering and LP production to receive LP of due level (corresponding to the standard). As a rule, the teacher has no opportunity to carry out a complete training link because of need of following to the educational program ordering studying of the following topic.
3. The result of performance of a task – student LP doesn't correspond to the standard, but the teacher passes to the following topic TM presentation. This situation in accuracy corresponds to that actually occurs at school.

The teaching link looks as follows:

1. TM preparation on a basis of not corresponding to a standard LP;
2. TM presentation and the work organization with it;
3. TM perception, memorizing, understanding and work with it;
4. The organization of activity of students on production of an learning product (LP);
5. LP production on the basis of TM delivered;
6. LP processing (an analysis and an assessment);

The teaching link has to be repeated as many times as it is necessary for receiving LP of due level. It would give the chance to carry out teaching in necessary quantity and quality in order that each student produces LP relevant to a standard and, thereby, shows full assimilation of TM.

It is obvious that the school is deprived of luxury of implementation of the teaching link in necessary quantity of times for each student to whom it is required. The teacher not only has no opportunity to carry out a teaching link, but also to process LPs of all students of a class. The teacher prepares the following TM not on the basis of knowledge of how the previous TM is assimilated by all students, and being guided only by the educational program. It leads to violation of the basic principle of didactics: "from the known – to the unknown". The majority of students little by little cease to understand the contents and semantics of the delivering TMs, lose faith in the forces and stop the attempts to study. Only those students continue successful study, whose initial level and abilities allow them to do without training from the teacher, relying only on their own efforts.

Use in educational process of the digital learning objects (DLO) having in the structure the measuring means of student achievement levels (comparison LP with a standard), are not so helpful, though give to the teacher an objective picture about LPs compliance to a standard degrees, nevertheless the teacher cannot use this information for the lack of time for implementation of the teaching link.

Information technology aspect

The interactivity demand exsists to modern DLOs. As a rule, the DLO developers supply their object with an epithet "interactive" in cases when transitions on hyperlinks are provided in it or correctness of reaction of the student is defined on the shown task. In fact these DLO properties have no relation to interactivity. With the same success it is possible to call interactive any paper book only because reading it anyone can choose on what page to open it and if there are tasks in this book, to glance in answers.

To deal with the sense of interactivity in DLO, we will address to the concept "interactivity". In information systems interactivity is understood, how information exchange. Thus, when to the student working with DLO opportunity to pass on a hyperlink or to press the button for choice are offered, information proceeding from the object is not the hyperlink or the button, but the sense of the message of DLO which predetermines the corresponding action of the student. For example, pressing the button of one of the wrong answers to a task testifies that the corresponding aspect of knowledge at the student allegedly is absent. Or that fact that the

student didn't use provided on the resource page a hyperlink, testifies that some TM part wasn't shown to the student. Interactivity of DLO arises when information received by an object from the specific student, thanks to his actions, causes in the object the reaction (provided by the developer) consisting in compulsory presentation to the student of that educational information on which the object found gaps in student knowledge. Thus, it is possible to claim that interactivity of DLO arises when in reply to actions of the student which are interpreted as some educational situation, the object shows to the student the individualized information making a certain pedagogical sense.

From above stated follows that some pedagogical purpose is by all means put into interactive DLO. And the task of DLO is that students reach this purpose. Interactive DLO builds an individual trajectory to the student, constantly sending him/her to not assimilated previous TM aspects until actions of the pupil will testify a successful conclusion of the DLO topic. Alternative to it is unsuccessful completion of work with DLO when the student gives up and stops work, without having achieved success. In this case he/she falls into hands of the teacher who completes with what the resource didn't cope.

Thus, use of correctly constructed interactive DLO allows to achieve that the student produce LP relevant to a standard. Thereby there is an opportunity to apply a correcting teaching link necessary quantity of times for each student. It means that use interactive (in the correct sense) DLO can eliminate the defect of an education system noted above.

Organization aspect

Now it was necessary to reasonably insert activity of students with EOR into educational process that noted theoretical opportunity could be implemented into practice.

At the present time the only technology which allows to build (without serious consequences) work of students with DLO into educational process, flipped-classroom technology [Bergmann, 2012] is. According to this technology both links of a training cycle will be organized as follows:

Learning link:

1. Training material (TM) preparation on the basis of the educational program - (teacher as usual);
2. TM presentation and the work organization with it - (teacher as usual in the classroom);
3. TM perception, memorizing, understanding and work with it - (students working with DLO at home);
4. The organization of activity of students on production of an learning product (LP) - (DLO);
5. LP production on the basis of TM delivered - (students working with DLO at home);
6. LP processing (an analysis and an assessment) - (students working with DLO at home);

Training link (necessary number of times for each student):

1. TM preparation on a basis of not corresponding to a standard LP - (DLO);
2. TM presentation and the work organization with it - (DLO);
3. TM perception, memorizing, understanding and work with it - (students working with DLO at home);
4. The organization of activity of students on production of an learning product (LP) – (DLO);
5. LP production on the basis of TM delivered – (students working with DLO at home);
6. LP processing (an analysis and an assessment) – (DLO);
7. Final assessment and work with certain students "manually" if necessary – (teacher in the classroom);

At such organization of educational process the defect noted above is completely eliminated.

Conclusion

As it was succeeded to show, possibility of elimination of the inborn defect of modern system of school education lies not in the field of better and better presentation of a TM to students - to that the vast majority of DLOis devoted, but in application of DLO, able to reach the pedagogichey purposes, together with the educational process organization based on the flipped classroom technology.

Bibliography

[Bergmann, 2012] J. Bergmann, A. Sams. Flip Your Classroom: Reach Every Student in Every Class Every Day. ISTE ISTD, 2012

[Pisarev, 2011] V. E. Pisarev, T. E. Pisareva. Pedagogy theory. *В. Е. Писарев, Т. Е. Писарева.* Теория педагогики. Воронеж, «КВАРТА», 2009, 611 с.

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