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The Use of Instruments of Formative Assessment of the Progress of Junior Pupils at the Math Lessons at Primary School

Problem. In terms of the new State standards for primary education, based on the principles of individually oriented and competency approaches, there is a problem of its approach to system of evaluation results of the quality of mastering of the educational material by students. Traditional assessment aims to evaluate only the level of student achievements. However, the new standard requires the State from teacher to the skills and competence (communicative, interdisciplinary, social) that will ensure the success of junior pupils in their personal and social development. It becomes difficult to a modern teacher to determine the level of formation of these skills and competencies so there is a new goal in front of the primary school teachers – to learn how to evaluate it.

Analysis of recent research and publications. Scientists and practicing teachers consider the evaluation of many aspects. Thus, the function evaluation pointed out in his works Sh. Amonashvili; the researches of N. Andreev, VI.Volkov, S. Lomako etc. were devoted to the motivating functions of assessment; T. Kanivets disclosed foundations of educational assessment in her study [2]; the evaluation of students studying in foreign schools was described in O. Lokshina works; modern means of evaluating of learning results are described by Burkitova A., A. Dudkina, Smalykina N., R. Shakirov [3]. S. Kalaur focused his attention on the preparation of future teachers for assessment of student achievements of natural subjects. However, unfortunately, the publications devoted to the preparation of primary school teachers to evaluate the junior pupils progress in learning weren't found.

There are three models of evaluation described by contemporary scholars:

- model of comparison;
- model of standards;
- model of development (formative assessment).

T. Kanivets considers evaluation based on the model of comparison as evaluating the quality of education. This model gives the teacher an opportunity to find out how students have achieved the level of knowledge and skills specified in the State standard. Analysis of the results of this evaluation provides an opportunity to identify problems in learning specific educational material and make relevant recommendations for improving the content, forms and methods.

The evaluation based on the model of standards gives an opportunity to compare the results of individual student learning progress with the result of the particular group standard to rank this student among other pupils in the class.

The evaluation based on the model of development is defined as a personality oriented. The objective of this model is to monitor the dynamics and learning progress of a pupil, but not his knowledge, abilities and skills in specific subjects. In some publications this model is called as formative assessment [2, p. 18-19].

The aim of the article is to review the instruments of formative assessment and the ways of its use at the lessons of mathematics in elementary school.

The main material. In the post-Soviet area the formative assessment was described at works of Russian scholars G. Golub, J. Fishman. [5].

In Ukraine, the problem of formative assessment was developed by N. Dementiyevska and others. Based on the researches of foreign scientists P. Black and D. William Ukrainian scientists approve that the use of formative assessment in learning leads to a significant improvement of its quality [6], because this model of evaluating aims to help each student to identify the gaps in his knowledge and see the progress of his own learning.

Formative assessment is a purposeful process of monitoring the education of the student. Formative assessment is informal, which means that teacher doesn't put any mark into the class register. This assessment is based on the assessment in accordance with the criteria and provides feedback through the "student - teacher" system. If the assessment is intended to improve the learning process based on individual student needs, it becomes formative.

The purpose of formative assessment is to correct teacher's and pupils' activity in the process of learning. This involves also students into the process of setting educational task to improve their learning results [3, p. 11-12].

Formative assessment is based on the following principles:

- 1) the teacher should provide regular feedback with his pupils;
- 2) the teacher should teach his pupils the principles of self-esteem assessment, how to improve their own learning results;
- 3) the teacher must change the methods and forms of teaching basing on the changes in learning results that are demonstrated by students;
- 4) the teacher should be aware that the assessment only with mark reduces the self-esteem of pupils and reduces the motivation to study in general [5].

To make formative assessment effective in the classroom a teacher should:

- formulate the purpose of the lesson;
- identify opportunities for pupils, to demonstrate them how they will achieve the goal;
- focus pupils on the results of their learning activities;
- set aside time in the classroom and provide pupils with an opportunity to discuss their progress;
- monitor the pupils' discussion and record everything that deserves attention;
- review his teaching plan basing on pupils results;
- create evaluation form to help pupils make their self-assessment

and correct their study.

If the primary school teacher will use formative assessment before starting teaching the topic, the analysis of the results will help him to determine the educational needs of his pupils, discover what exactly pupils already know about the subject of the new topic, how deep they know the material, to outline the interests of pupils, and formulate the purpose of learning basing on these information.

Formative assessment may be used in the process of studying the topic. In this case, the teacher can encourage pupils to work independently, organize them into groups, to check how they learn academic material, to motivate them for further work.

There are several strategies of formative assessment aimed to improve learning results:

1) strategies of assessment of pupils' educational needs. The instruments of these strategies are: discussion, "brainstorming", analysis of graphical means of visualization of knowledge;

2) strategies of encouraging the independence in education. The instruments of these strategies are: self-evaluation forms, forms of feedback from classmates, evaluation of cooperative work in the group;

3) strategies of monitoring the progress in education. The instruments of these strategies are: informal observation of the teacher, analysis of interesting cases while studying the topic, analysis of the pupils reports;

4) strategies that check the understanding of academic material. The instruments of these strategies are: informal survey, the register of observations over the pupils activities [1].

The instruments of formative assessment that help teachers to plan effective teaching are: time graphs, tables, checklists, feedback letters etc.

Time graphs usually have a horizontal line of three segments: beginning of studying the topic, in the process of studying the topic, after studying the topic. During each segment teacher writes those assessment methods that he will use while working on a specific theme. This approach allows the teacher to easily verify that he uses different assessment methods and to define their sequence.

Choosing a table as an instrument of formative assessment, teacher creates it to show what tasks pupils should do while working on the subject, what exactly will be assessed and with what criteria. Also it's possible to add points to this table that students can get by doing certain activities.

Checklists somewhat similar to the table - they also specify a list of

tasks that pupils have to do in the process of mastering the theme and also there is an added graph in which a pupil writes when he will do this task. This can be done by a pupil himself or together with the teacher.

Feedback letters by teachers are to assess the qualitative evaluation of interim and final results of pupils learning activities. Feedback letters help pupils to set their own learning goals and plan their activities to achieve them; be informed about the results of their work in accordance with pre-agreed criteria, thus maintaining motivation to learn; receive comments from the teacher or classmates about the planning of their activities to achieve better educational results; master algorithm of evaluation of their learning progress, starting from primary school [5, p. 51].

We believe that to identify pupils progress in learning Math and to involve junior pupils in the process of self-assessment of their academic excellence, a teacher should use following instruments of formative assessment:

- 1) K-W-L tables;
- 2) weekly reports;
- 3) concept maps.

These instruments can be easily used by pupils of primary school and a teacher can use them at a Math lesson of any type.

K-W-L table (ukr. - З-Х-Д таблиця) consists of three columns with such titles as "Know", "Want to Know", "Learned." Above the table the theme is written. At the beginning of studying the topic students fill in the first column of the table by themselves or together with the teacher. They write what they already know on the subject from previous lessons or from personal experience. Then proceed to fill in the second column, which indicate what they want to know on the subject. Questions to the second column can be added throughout the whole period of studying the theme. At the end of the studying the topics they fill in the third column, where indicate what they have learned while studying the material. A

Table 1. K-W-L table (example)

Square of the shapes		
What do I KNOW about shapes?	What do I WANT to KNOW about square of the shapes?	What have I LEARNED about square of the shapes?
<i>(example of pupils answers)</i>	<i>(example of pupils answers)</i>	<i>(example of pupils answers)</i>
Shapes are circles, triangles etc.	How to measure the square of the shapes?	Square of the shapes is measured in sm ² .

teacher should mind that the third column should have answers to the questions written in the second column. For example, while studying the theme "Square of the shapes" in the 4th form a teacher can create such table (Table. 1)

K-W-L tables help teachers to revise basic knowledge of pupils before starting a new topic and according to this correct his teaching plan. After filling in all three columns of such table junior pupils are able to see their progress in learning that makes their studying motivation stronger.

Weekly reports are the papers that pupils write at the end of each week by answering three questions: What I learned this week; questions that remained unclear to me; If I were a teacher what question I would ask to the pupils to understand if they have mastered the material.

For example, when studying the theme "Fractions" in the 4th form pupils may want to fill out a weekly report answering the following questions:

- What did I learn about fractions this week?
- Which questions about fractions remained unclear to me?
- If I were a teacher what I would ask about fractions to see if my pupils understood the topic?

These reports allow teachers to identify the main difficulties and false judgments that pupils formed while studying the subject, get feedback and reorganize teaching plan. Pupils should be aware that these reports help them to move successfully in studying the topic, otherwise they will not be serious working with them.

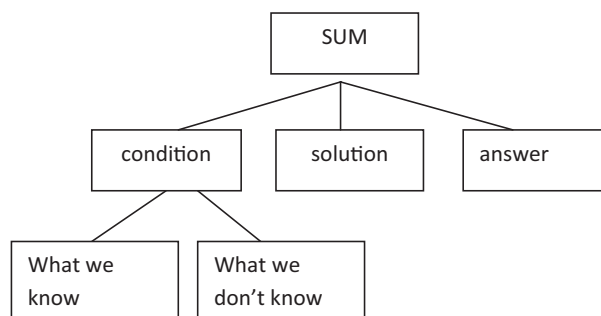
To assess students' weekly reports a teacher should distribute the answers to the second and third question to levels. M. Pynska [4] offers the following levels:

- 1) minimum level- the question that requests factual information (What is fraction?)
- 2) low level- questions that request comparative information (What is the difference between numerator and denominator?)
- 3) modeling level - conceptual issues and questions concerning the work that was done in previous lessons (Do we have to reduce fractions to common denominator when we need to subtract?);
- 4) highest level - issues that require explanations that were not given on the previous lessons; usually start with "why" (Why does nominator always smaller than the denominator?).

To identify the formation of students' mathematical concepts a teacher can use such instrument of formative assessment as a concept

map. Concept map is a two-dimensional hierarchically organized chart that reflects the structure of knowledge in a particular subject area in the way the pupil understands it. Concept map consists of names of concepts that are written in the frames and the lines that shows the connections between these concepts from the general to the particular one.

For example, while working on formation of the concept “A Sum” in the 1st form a teacher may ask pupils to create a concept map showing the parts of a sum.



Pic. 1. Concept map (example)

While assessing the concept maps teachers should pay attention to their quality indicators that reflect the accuracy and depth of knowledge of pupils. The concept map should reflect the most important concepts of topic, links between concepts must meet the scientific facts, a concept map should have enough hierarchical levels, concept map should change in a few days or weeks, according to studying new concepts on the topic. M. Pynska offers to give 1 point for each correct link between concepts, 5 points for each hierarchical level, 10 points for each correct connection between concepts from different parts of the map and 1 point for each correct example [4, p. 34].

Conclusions. Formative assessment does not improve pupils' progress in Math by itself. Junior pupils will learn Math better only if the information received by the teacher during the formative assessment will be used to help them to become more independent in the learning process, taking into account their individual characteristics. Educational activity of pupils is effective only if it meets the needs of the child. Formative assessment at the Math lessons in primary school is provided not only by a teacher but also by pupils because they are in the center of the learning process. Formative assessment excludes comparing pupils with each other, and focuses on

personal progress of each pupil. Skillful use of the instruments of the formative assessment at the Math lesson in primary school will let a teacher to help his pupil to identify the gaps in their knowledge and concentrate on how to achieve better results in school.

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Transliteration of references:

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Abstracts

ГАННА ШКІЛЬОВА, СВИТЛАНА ДУБЯГА, ЮЛІЯ ШЕВЧЕНКО.
Використання інструментів формування оцінки досягнень молодших школярів на уроках математики в початковій школі. У статті розкрито стратегії формувального оцінювання, проаналізовано методи та інструментарій формувального оцінювання, висвітлено особливості формувального оцінювання порівняно з традиційним оцінюванням, розглянуто використання інструментів розвивального оцінювання на уроках математики в початковій школі.

Ключові слова: оцінювання, формувальне оцінювання, навчальні досягнення, урок математики, початкова школа.

ГАННА SZKILIOWA, SWITŁANA DUBIAGA, JULIA SZEWCZENKO. **Wykorzystanie instrumentów kształtowania oceny osiągnięć uczniów młodszych klas na lekcjach matematyki w szkole podstawowej.** W artykule przedstawiono strategię oceniania

kształtującego, przeanalizowano metody i narzędzia oceniania kształtującego, opisano zalety oceniania kształtującego w porównaniu do konwencjonalnego oceniania, podano przykłady stosowania narzędzi oceniania kształtującego na lekcjach matematyki w szkole podstawowej.

Słowa kluczowe: ocenianie, ocenianie kształtujące, osiągnięcia szkolne, progres w nauczaniu, matematyka, szkoła początkowa

АННА ШКИЛЕВА, СВЕТЛАНА ДУБЯГА, ЮЛИЯ ШЕВЧЕНКО.
Использование инструментов формирования оценки достижений младших школьников на уроках математики в начальной школе. В статье раскрыты стратегии формирующего оценивания, проанализированы методы и инструментарий формирующего оценивания, освещены особенности формирующего оценивания по сравнению с традиционным оцениванием, даны примеры использования инструментов формирующего оценивания на уроках математики в начальной школе.

Ключевые слова: оценка, формирующее оценивание, учебные достижения, прогресс в обучении, математика, начальная школа.

GANNA SHKILYOVA, SVITLANA DUBIAGA, YULIA SHEVCHENKO. **The use of instruments of formative assessment of the progress of junior pupils at the math lessons at primary school.** The author described the strategies of formative assessment, presented an analysis of the methods and instruments for the formative assessment, the features of formative assessment in comparison with traditional assessment, and described the use of instruments of the formative assessment at the Math lessons at primary school.

Key words: assessment, formative assessment, educational progress, Math lessons, primary school.