

PROMOTING REFLECTION-RIGHT KEY FOR GETTING STRUCTURAL KNOWLEDGE

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ABSTRACT

Reflection is thinking for an extended period by linking recent experiences to earlier ones in order to promote a more complex and interrelated mental schema. Almost everybody believes that “reflection is useful in the learning process”, but it is often difficult to encourage reflection among the learners. In this paper I will try to promote reflection by well planned homework and its oral explanation. This cannot be an isolated process, but cooperation with active methods and differentiation and individualization. All of this support reflection, which according to my opinion is essential for obtaining structural knowledge.

Key words: reflection, structural knowledge.

Educators normally consider Dewey (1933) as the modern day originator of the concept of reflection, although he drew on the ideas on earlier educators such as Aristotle, Plato and Confucius. He thought of reflection as a form of problem solving that chained several ideas together by linking each idea with its predecessor in order to resolve an issue. Reflection normally involves looking for: commonalities, differences and interrelation beyond their superficial elements. The goal is to develop higher order thinking skills.

Reflection is defined as an observation on one's own thinking and personality, self-evaluation for the effectiveness of thinking and behavior. Reflective thinking is the thinking that ends with understanding and self-knowledge for one's own thinking and cognition. Reflective thinking includes adequate interpreting of one's own intellectual qualities, such as heuristics, accuracy, algorithmic, discourse, visualization and creativity in the thinking process.

Reflection is the summit of understanding, clarity, and the aha-moment. Reflection is a degree of individual self-evaluation of every subject and is suitable moment for the second choice. From the extensive presentation of the topic, the student voluntarily chooses ideas, values, motives, positions, skills which he/she sends for restructuring in the subsystems of cognition.

In the correctly set textual task, the students discover something known as well as something unknown. The last begins with searching of congruence of the

unknown with something known in the existing structures of all levels, whereas the methodical person: subsystems, functional systems and notions. This pursuit is conducted by supplementary adding to the unknown from the known in all subsystems of the personal system. The successful completion of this pursuit depends on the activity of the abstract operations: analysis, synthesis, comparison, classification, generalization, etc and ends in one specific type of restructuring of the appropriate subsystem: new configuration which represents complex solution with high degree of emotional experience – the “aha-moment”. This success or failure influences the subject’s self-evaluation and self-knowledge, and through them influences the person’s reflective ability.

The phenomenon reflection is present in the contents of all classes for learning new material as well as classes for practice, but only when there is understanding which incites self-knowledge and self-evaluation. To understand new knowledge or ability means to clearly include that same knowledge in the system of the subject’s knowledge and ability. If this occurs through optimal concentration of the maximum opportunity, the person experiences the ‘aha-moment’, the moment of satisfaction from the clarity of the notion learned and makes the second choice, selection of that which places it in the subsystems of one’s own cognition to participate in the restructuring. Essentially, the obtained knowledge is cognitive and permanent.

Although basically reflection is a personal activity, it can be prompted, improved and guided by the teacher’s correct behavior. Even though perhaps the teacher’s most important role is to successfully guide the students’ work, practice of active teaching, differentiation and individualization of teaching, one of the multitudes of possibilities to prompt reflection is the correct choice of tasks assigned for homework and their appropriate inspection afterwards.

Homework is not only continuation of the work done in class, but it is also the highest degree of the student’s individual work. Having in mind the significance of the student’s individual work, it can be said that the homework is of the same significance as is the work done in class. Therefore, it is of great importance that the homework is well thought of and correctly realized, because on the contrary it is illusory to expect significant results from the mathematics teaching.

The functions of the homework are the following:

1. Students have to consolidate the teaching material taught during lessons.
2. Students have to prepare for effective and successful adoption of the teaching material which will be taught the following lesson.
3. Revision and systematization of the teaching material which is learned in the previous lessons.

Assigning and completing homework provides durability of knowledge, because the success of the performance in the school is conditioned by the organization of independent activities for students, thus the acquired knowledge is consolidated, systemized, broadened, explored in greater depth and enriched with new knowledge. However, another significance of the homework is present in the fact that, through the homework, parents obtain insight in the manner in which their child studies at school, insight in the teaching material and the teacher's performance. All this not only strengthens the bonds between the school and the home, but provides an opportunity for direct public evaluation of the teacher's performance, i.e. the school as an educational and instructive institution.

If we take into consideration what is previously stated, then it is absolutely clear that while assigning homework the teacher should take into account the following:

1. The content of the homework must stem from the school teaching, i.e. it must be based on the material studied during the actual or few previous lessons,
2. The homework must be adapted to the students age,
3. The time needed to do the homework,
4. The technical and material supplies which are necessary for completing the homework,
5. The volume and the difficulty of the homework, which infers that it should be completed by the majority of students, and not only by the best students in the class,
6. The homework must not be too easy, so that the students should not make extra efforts, but it must not be too difficult as well,
7. To assign tasks that can be easily and comprehensively checked by the teacher, and
8. The homework must be clearly and accurately formulated.

From the previously stated we can conclude that the homework must be accurately and timely assigned. We can say that the homework is accurately assigned if it can be completed by almost all of the students individually. With regard to the timely assigning the homework, it is important to mention that it should not be assigned at the very end of the lesson. If the homework is assigned quickly and at the very end of the lesson or after the school bell marking the end of the lesson, then the students, especially the weaker ones, in most cases will not understand the task, which will undoubtedly cause them difficulties while completing it. Therefore, it is beneficial for the students that the teacher states a special time during the lesson for assigning homework. At the same time, we should insist on the students writing down the homework in their notebooks, and not forgetting the clear instructions for the completion of the same. Apart from the instructions for the completion of the homework, teachers should point out not only

some of the difficulties that can occur while doing the homework, but the most difficult elements of the homework as well. As a rule, the younger the students are, the more detailed the instructions for doing the homework must be.

We have already stated several moments that the teacher should take into consideration when assigning homework. Nonetheless, the main characteristics of any homework are its *content* and *amount*.

The content of the homework can be wide-ranging. The tasks which are assigned for homework must be diverse and arranged according to their complexity. The type of tasks assigned for homework may be in the function of:

- Oral expression
- Written expression
- Training (making schemes, drawings, graphs and models, various measurements and the similar).

As a rule, the content of the assigned homework must stem from its functions; therefore any homework assigned in math teaching frequently consists of the following two parts:

- Tasks to consolidate the newly-learned material, part of which may be formulated in a way that allows revision and systematization of what was learned in one or several thematic units, and
- Tasks which directly prepare the students to learn the new material taught in the following lessons.

The content of the assigned homework should be enriched with more difficult tasks, intended for students that want to learn more. These tasks must not be compulsory for all the students because they are in the function of the extra work. However, occasionally, in order to encourage students' extra work, it is beneficial if the teacher explains the solutions to the tasks and names the students who successfully completed them.

With regard to the amount of the assigned homework, we should take into consideration that it must be "optimal". That is to say, if the homework is of too small amount, then it most certainly will not fulfill its function, and if it is of too large amount, then there is the possibility that greater part of the students will copy it, which leads to the situation when the homework does not fulfill its function. When we discuss the amount of homework assigned, we should consider the indisputable fact that students do not go to school to study only mathematics, that is to say, students have the obligation to study other subjects prescribed by the school curriculum. For that reason, the teacher needs to take into account the amount of time needed to carry out the assignment. Numerous opinions exist regarding the time needed to complete the assigned homework. Above all, it depends on several factors, for example: the age of the students, type of lesson when the homework is assigned, students' level of knowledge, time of the week,

difficulty of the studied material and the like, and consequently we cannot generally state the specific amount of time needed to complete the assigned homework that will be applicable for every situation. However, experience shows that math homework can consume approximately 80% of the time spent for studying during the day when there is a math lesson at school, which means approximately 35 minutes in our situation.

Before we turn our attention to the meaning of checking the assigned homework, I would like to give an example for homework that the teacher can assign to students from the VIII grade while studying the unit *Application of systems of two linear equations with two variables*, where the tasks marked with * are intended for students who want to learn more.

1. The sum of two numbers is 35, and the difference between them is 5. Which are these numbers?
2. Kiro bought total of 8 squared and lined notebooks and paid 250 denars. One squared notebook costs 50 denars, and one lined notebook costs 20 denars. How many notebooks of each kind did Kiro buy?
3. The sum of the digits of one two-digit number is 8. If the digits change their position you get a number which is 18 more than the given number. What is the number?
4. A car started from the position A. After half an hour, another car started and reached the first car after 2.5 hours driving. The two cars continued driving in the same direction. It is noted that the faster car after 1.5 hour from the moment it reached the other car, was 24 km before the slower car. Find the velocity of the two cars if we know that both of them were moving with constant speed.
- 5*. A swimming pool is filled with water from two pipes. If the pipes are released simultaneously, the swimming pool is filled in 12 hours. If the first pipe alone fills half of the swimming pool, and after that the second pipe alone fills the second half of the pool, then the pool is filled in 25 hours. What is the time needed for each pipe alone to fill the swimming pool?
- 6*. Atanas travels by boat on the river Drim, from Struga to Globochica and in the opposite direction too. The distance between Drim and Globochica is 18 km and he travelled total of 8 hours. What is the velocity of the river Drim, if Atanas travels for the same time 4 km downstream and 2 km in the opposite direction?

At the end of this part we will turn our attention to going over assigned homework and the fact that this has to be well planned in advance. Checking homework, as a rule, influences the quality of the completion as well. Therefore, while going over the assigned homework it is not sufficient to only state whether

the student has completed it or not, but how the students completed the assignment should be important as well. This means that the teacher should analyze the homework and point out some of the omissions and mistakes to the student, if possible from another student. In addition, by analyzing the homework, incidentally, the teacher has the opportunity to realize which mistakes are mutual for the whole class, which are specific for individual students and thus take measures to eliminate them.

On the subject of going through assigned homework, we can say without any restraint that it is a serious mistake to disregard or minimize it. Namely, at the beginning the student usually works on his homework thoroughly and in the best belief that has done something good, if not exceptional. Hence, if the assignment is not checked, then after coming back from school the student can inform his/her parents. This teacher's action can be justified only if it occurs once or twice, but if it continues, then the parents receive an unfavorable image for the school, and the student starts to neglect the responsibilities and becomes superficial.

There are several methods to checking homework, and we will mention the following:

- **Superficial** checking homework, performed at the beginning of the lesson, by walking through the classroom. This type of checking homework does not take up a lot of time, but only gives insight into which students have and which have not completed their assignments, and no knowledge on the independence and comprehension of completing the homework. Moreover, the students are passive during this type of checking homework; hence it is advisable to combine it with some of the other methods of checking homework.
- **The short quiz** comprised of tasks from one or more previous homework assignments, which can be done during a period of 10 minutes, as well as the **oral examination** at the beginning of the lesson asking the students to state some of the key moments during solving the tasks, enable a better insight into the independence and comprehension of completing the homework.
- **The complete checking** of homework carried out by taking the students' notebooks and going through the assignments outside the lesson, requires greatest degree of engagement from the teacher. It is believed that this method is the best but it fails to take into consideration the fact that the teacher has no real contact with the students, and consequently cannot have an insight into the independence of completing the homework and the comprehension as well.

The selection of the method of checking homework, above all, depends on the following:

- The content of the homework,
- Time available for checking the homework,

- The number of students in the class
- The link between the homework and the new lesson etc.

However, having in mind the previously stated, it appears that the combination of superficial checking and the short quiz or oral examination, at the beginning of the lesson will provide the most effective results. That is to say, this combination enables not only insight into whether the homework is at all completed, but also provides possibility to obtain knowledge on the independence and comprehension of completing the homework. Simultaneously, the teacher should incite discussion between the students regarding the assignments as well as argumentation of the appropriate solutions. Additionally, the teacher can assign tasks which can be completed in more than one way, so that the students can discuss their methods, solutions and comparisons the following class. Moreover, students can analyze a given correct solution; try to find another solution or some kind of modification.

Conclusion

I really hope that these strategies have the potential to encourage reflection, and I will try to find evidence in the future to show that this is actually being achieved.

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