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USING BRAINSTORMING AND CASE-STUDY METHOD IN PRACTICAL CLASSES OF MICROBIOLOGY

Nazarov Jalolitdin-Sulton Erkinovich

Bukhara State Medical Institute named after Abu Ali ibn Sino

✓ ***Resume***

According to some researchers, if the students are interviewed immediately after the lecture, they can reproduce 65-70% of the educational lecture material, after 3-5 days this figure is 45% at best. After a week, only a third of the students (34%) can recall the teaching material. After 2 weeks, this figure drops to 30%. These points indicate the role of passive perception of information, and its influence on the duration of memorization. In the case of teaching medical students, it is especially important to convey the meaning of the educational material. The information must be conveyed in such a form so that the students could remember it, and in the current, real clinical situation, do not get confused and show the theoretical knowledge gained in practice.

Keywords: Brainstorming, case study, idea generation, cascade modification, electronic brainstorming, situational assignments, evaluation cases.

ПРИМЕНЕНИЕ МЕТОДОВ «МОЗГОВОГО ШТУРМА» И «CASE STUDY» НА ПРАКТИЧЕСКИХ ЗАНЯТИЯХ ПО МИКРОБИОЛОГИИ

Назаров Жалолитдин-Султон Эркинович

Бухарский государственный медицинский институт имени Абу Али ибн Сино

✓ ***Резюме***

По данным некоторых исследователей, было выяснено, что если сразу же после лекции опросить студентов, то они могли воспроизвести 65-70% учебного лекционного материала, спустя 3-5 дней этот показатель равнялся в лучшем случае 45%. Через неделю вспомнить учебный материал могли только треть учащихся (34%). Через 2 недели эта цифра снижалась до 30%. Это свидетельствует о роли пассивного восприятия информации, и его влияния на длительность запоминания. В случае обучения студентов медицинских ВУЗов особенно важно донести смысл учебного материала. Информацию надо донести в такой форме, чтобы обучающиеся смогли бы запомнить её, и в сложившийся, реальной клинической ситуации не растеряться и проявить полученные теоретические знания на практике.

Ключевые слова: Мозговой штурм, case study, генерация идей, каскадная модификация, электронный мозговой штурм, ситуационные задания, оценочные кейсы.

“МИЯГА ЖАДАЛ ҲУЖУМ” ВА «CASE STUDY» УСУЛЛАРИНИ МИКРОБИОЛОГИЯ ФАНИНИНГ АМАЛИЙ МАШҒУЛОТЛАРИГА ҚЎЛЛАШ

Назаров Жалолитдин-Султон Эркинович

Бухоро тиббиёт институти

✓ ***Резюме***

Баъзи тадқиқотчиларнинг фикрига кўра, талабалар маърузадан сўнг дарҳол интервью олишса, ўқув маъруза материалининг 65-70% ини айтиб бериши мумкин экан, 3-5 кундан сўнг бу кўрсаткич энг яхши 45% ни ташкил этди. Бир ҳафтадан сўнг талабаларнинг учдан бир қисми (34%) ўқув материалини эслаб қолиши мумкин эди. 2 ҳафтадан сўнг бу кўрсаткич 30% га тушиб кетди. Бу эса ахборотни пассив идрок этиш ролини ва уни эслаб қолиш давомийлигига таъсирини кўрсатади. Тиббиёт талабаларига таълим беришда ўқув материалининг маъносини етказиш айниқса муҳимдир. Маълумот шундай шаклда етказилиши керакки, ўқувчилар уни

эслаб қолишлари мумкин, ҳозирги, ҳақиқий клиник вазиятда эса йўқолиб кетмаслиги ва олган назарий билимларини амалда кўрсатишлари керак.

Калит сўзлар: Мия штурми, кейс-стади, фикрлар генерацияси, каскад модификацияси, электрон мия штурми, вазиятли вазифалар, бахолаш кейси.

Relevance

It is no secret that a man learns the basic information visually. Since 85% of the content is acquired through the vision, it is necessary to develop visualization in teaching. It is imperative to provide students with one or another graphic information. These can be presentations, films, tables, cards, etc.

The next important aspect is informational dosage, i.e. it is necessary to select the optimal amount of information without overloading with facts, evidence, conclusions, hypotheses, etc.

At the same time, it is very important that there is feedback between the teacher and students, which leads to figurative live communication and, as a result, memorization. Gyorgy Poya, American mathematician and popularizer of science said, "The best way to learn something is to discover it." Therefore, it is necessary to remember that the best form of education is when the student participates in the educational process independently and actively. There are many different techniques designed to involve people in a fun way in solving certain issues. We will analyze two teaching methods, the brainstorming and the case study method.

The brainstorming and the case method originated at about the same time in the early 20th century in the United States. During brainstorming, participants discuss the current problem and put forward the maximum number of options for solving the problem. At the same time, one can put forward the most fantastic and ridiculous hypotheses. From the obtained options, the best solutions are selected that can be used in practice. This method takes into account the efficiency and synchronicity of finding the answer to the task. The term "brainstorming" comes from two English words: brain - brain, storming - storm, storm, strong excitement. It is sometimes called the technology of deferred idea evaluating. This type of group discussion was developed in the late 30-s of the XX th century, by copywriter Alex Osborne, who revealed that the expectation of a negative assessment inhibits the process of proposing hypotheses during the discussion.

In the brainstorming process, as a rule, the solutions are not distinguished by high originality at the beginning, but after some time, typical, stereotyped solutions are exhausted, and the participants begin to have unusual ideas. The facilitator writes down or registers all the occurred ideas during the brainstorming session [8].

The goal of brainstorming is to stimulate the creative and intellectual activity of students. This is an operational method for solving a problem, in which the participants are asked to express as many solutions as possible, including the most fantastic ones. From the total number of ideas expressed, the most science based ones are selected that can be used in practice.

A well-organized brainstorming session includes three mandatory items. They differ in the organization and the rules for their implementation:

1. Problem formulation. Preliminary stage. At the beginning of this stage, the problem should be clearly formulated. The participants are selected, the leader is determined and the other roles of the participants are assigned, depending on the problem and the chosen method of conducting the storm.

2. Idea generation. The success of the entire brainstorming largely depends on this main stage. Therefore, it is very important to follow the rules for this stage:

1) The main thing is the number of ideas. Do not make any restrictions.

2) A complete ban on criticism and any (including positive) evaluation of the ideas expressed, since the assessment distracts from the main task and knocks down the creative mood.

3) Unusual and even absurd ideas are welcome.

4) Combine and improve any ideas.

3) Grouping, selection and evaluation of ideas. This stage is often overlooked, but it is he who allows you to highlight the most valuable ideas and give the result of the brainstorming session. At this stage, unlike the second, the assessment is not limited, but on the contrary, is encouraged. The methods for analyzing and evaluating ideas can be very different. The success of this stage directly depends on how "equally" the participants understand the criteria for selecting and evaluating ideas [10].

For brainstorming, the participants can be divided into several teams:

- generators of ideas who express various proposals aimed at solving the problem;
- critics who are trying to find negative sides in the proposed ideas;

- analysts who will link the developed proposals to specific real conditions, taking into account critical remarks, etc.

The basic rules of any brainstorming are the following provisions. It is necessary not to remember the order in which the participants express their opinions and not interrupting each other and to give time to tell one or another idea [6].

The key position of "brainstorming" is the possibility of putting forward any, the most phantasmagoric hypothesis.

You cannot criticize other participants, for their sometimes-ridiculous statements, on the contrary, any idea should only be welcomed. Despite the number of ideas, you need to keep thinking, even if you believe that your fantasy is exhausted.

An example proposed for use in practical classes in microbiology at a medical school, by students of the medical faculty. 5 minutes are allocated for the brainstorming session.

When considering the topic "Methods of sterilization", students may be asked the task: Explain the essence of the method of tyndalization, proposed by the English physicist John Tyndall. **Why liquids are heated fractionally (from three to five times) for an hour and the intervals between heating are 24 hours with this method?** 5 minutes are allocated for the brainstorming session.

Within one minute, students write down the answer options in their notebooks.

The answers can be following:

- because thereby it is more reliable to destroy thermophile microorganisms, i.e. those bacteria that can withstand high temperatures;

- because it will be clear whether any microflora has started up on the substrate, if so, the heating is continued again.

- because at intervals in the heated material, the "fermenting" microflora, which is antagonistic to pathogenic microorganisms, will populate.

At the end of the "storm", all the proposed ideas are analyzed, in which the whole group participates.

The students are told the correct answer: during the long intervals between fractional heating, bacterial spores that survived at 100 ° C germinate, and the vegetative bacterial cells released from them die during subsequent heating. In addition, there is tantalization at 56 ° C. This tantalization is used for substances that are easily destroyed and denatured at a temperature of 60 ° C (for example, protein liquids).

If the students are passive in proposing ideas, the teacher is recommended to use the methods of activating thinking, the creative abilities of the participants. You need to read the proposed ideas and start combining them in a variety of ways. Remember, that the cornerstone of a brainstorming session is any crazy idea.

For example, you can draw a fantastic analogy in the situation discussed. Invite the participants to formulate the main unremovable obstacle to the solution of the problem, and then to “cancel” it for a while. In the above example with the tantalization method, the main factor is the presence of various microorganisms in the external environment. It is possible to assume for some time the existence of a magical substance in nature, which disinfects all objects from microbes within a radius of 7 kilometers without any temperature effect, etc. Proceeding from this, it is possible to develop new theories, in which, over time, a rational kernel will necessarily appear.

Brainstorming is used in the absence or minimal, insufficient amount of information. The use of brainstorming is advisable when identifying new alternative directions for solving the problem.

The "brainstorming" method allows you to involve the maximum number of students in active activities. The application of this method is possible at various stages of a practical lesson: for the introduction of new knowledge, intermediate quality control of the assimilation of knowledge, consolidation of the acquired knowledge (in a generalizing lesson on a specific topic of the course).

In higher education, it is imperative to introduce innovative teaching methods that enhance students' creative and independent thinking. In our informative age, when the volume of information is growing exponentially, under conditions of limited time, great hopes are placed on innovative teaching methods. Due to innovative pedagogical technologies, all necessary skills and abilities are formed for future specialists in various fields of science [9].

"Brainstorming" is also an innovative and effective method of stimulating cognitive activity, the formation of creative skills of students in both small and large groups. Moreover, thanks to this method, skills are formed to express their point of view, listen to opponents, and reflexive skills.

The disadvantages of brainstorming include the fact that this technology is not applicable to discussions on moral and ethical topics. There is also no guarantee of finding best ideas with this method. However, the advantages of brainstorming technology clearly outweigh the disadvantages.

The advantages of brainstorming include the simplicity of use of this method. To master "brainstorming" no preliminary training is required, high-tech equipment, the results are obvious and easy to assess. Thus, this method is good for aspiring teachers. At the same time, the

brainstorming method has a wide range of applications. It allows you to search for solutions to problems in the study of different disciplines. The resulting brainstorming skill can be useful in the future in various areas - from professional activity to personal life. Brainstorming does not require high competence of participants, which is very important for pulling up lagging students, involving them in an active learning process. The time spent on brainstorming is acceptable from 10 minutes to 3 hours. However, the most important point of the method is to go beyond the standard ways of solving problems. This is very important for students of medical universities, who will often face emergency situations in future in their practice. This method develops independent, creative thinking and focuses on the development of original ideas, new approaches to the researching problem.

The case study method was developed and first applied at Harvard Business School in 1924, whose faculty quickly realized that there was no textbook suitable for a graduate program in business. Their first solution to this problem was interviewing leading business practitioners and writing detailed reports on what these managers were doing and the factors affecting their performance. The listeners were given descriptions of a certain situation that a real organization faced in its activities in order to get acquainted with the problem and find a solution themselves and in the course of collective discussion [3].

Case study or the method of specific situations is a teaching technique that uses a description of real economic, social and other various situations. Students should investigate the situation, understand the essence of the problem, suggest possible solutions, and choose the best one. Cases are based on real factual material or are close to a real situation.

The name of the case method comes from the Latin **casus** - confusing unusual case; as well as from the English **case** - a briefcase, a suitcase. The origin of the terms reflects the essence of the technology. A “case” is a spatially limited phenomenon observed at a particular moment or for a certain time.

Another interpretation of case method, given by Professor R. Murry from Harvard, should also be noted: "By the case method, I mean the study of a subject by students by considering a large number of cases in certain combinations. Such training and attempts to manage various administrative situations develop in the student, often unconsciously, understanding and the ability to think in terms of the main problems faced by a manager in a particular field of activity. " The case method includes two complementary approaches. The first involves a detailed study of one specific example to identify the typical properties of a whole class of phenomena or, say, the patterns of a particular process (actually a case study). The second approach is associated with the study of a small number of examples (cross-case study - the method of "cross cases") [2].

Students receive an assignment (case) from the teacher, with the help of which they either identify the problem and ways to solve it, or develop options for getting out of a difficult situation when the problem is identified. This is a teaching technique using descriptions of real-life situations. Students should analyze the situation, understand the essence of the problem, suggest possible solutions and choose the best one. The central concept of the method of learning specific situations is the concept of "situation", that is, a set of variables when the choice of any of them decisively affects the result.

The possibilities for using this method are wide enough, practically endless. The case technology realizes its potential only if the appropriate methodological support has been created - good quality cases have been developed and the structure of their application in each lesson. The cases developed for the training of medical laboratory technicians have their own specifics - they are not as voluminous as the classical ones, at the same time, all the situations presented in them are taken from laboratory practice [4].

The existence of the only correct solution is denied in principle. The student has to make decisions and justify it himself with this method of teaching.

Cases, usually prepared in writing and based on real facts, are read, studied and discussed by students. Cases form the basis of a teacher-led classroom conversation. Consequently, the case study method simultaneously includes a special type of educational material and special ways of using this material in the educational process. Situations analysis acts as a different way of thinking of the teacher, his special paradigm, which allows him to think and act differently. Thus, the teacher renews his creative potential.

For a student, the emphasis in study needs to be shifted not to mastering ready-made knowledge, but to developing it, to the co-creation of a student and a teacher, where the fundamental differences between the Case study and traditional teaching methods.

The technology of the case method is quite simple, but at the same time, it requires a restructuring of the existing traditional actions, both for the teacher and the student. In a medical school the case study method is a teaching method that takes into account all properties of the subject and

forms the necessary knowledge, skills and abilities. In addition, the case method has the potential to implement integrated learning. This method is aimed at solving a certain problem; however, this problem is not given in a finished form, but is formulated by the teacher, based on the conditions of a real educational situation. The point is that students are offered to comprehend a real-life situation, the description of which reflects not only any practical problem, but also actualizes a certain set of knowledge that must be learned when solving this problem simultaneously. The solutions proposed by students can be assessed by the degree of effectiveness, by the validity of the decision, the cost of resources, but at the same time a variety of solutions will be correct, corresponding to the task. Thus, educational material is presented to students in the form of situations (cases), and knowledge is acquired as a result of active and creative work: independent implementation of goal-setting, collecting the necessary information, analyzing it from different points of view, proposing hypothesis, conclusions, self-control of the process of acquiring knowledge and its results.

The case should contain:

• A problem with several options for its solution;

• Supporting information;

•The task;

Working with a case (situational task) has its own specifics and involves a variety of technological approaches. The specific way of creating, a problem situation and the organization of independent work depend on a number of factors: the degree of complexity of the teaching material, the available time, the characteristics of a specific contingent of students, etc. Application of the case method performs several functions - teaching, educating, organizing and research. In practice, these functions are quite often implemented separately; their organic unity is observed in the process of using [1].

The situational technique teaches not only the student, but also the teacher. Using the situational method in practical lesson the teacher learns to select the appropriate real material for methodological developments with cases. At the same time, the teacher learns to write a case himself, laying in its basis several possible solutions of current problem. During the lesson, the task of the facilitator is to help students to reason, argue, debate, but not to impose his/her own opinion on the problem [11].

The work on creating a case and questions for its analysis is creative. It is carried out outside the classroom and includes research, methodological and constructive activities of the teacher. You can take a specific situation from real life (medical history, complex clinical case, production problem).

The situation is prepared by the teacher in advance, then that part which is an incident, is read out. Students ask questions. Each subgroup makes its own decision, and only then, its aspects are discussed in an open discussion.

Work on a case as a situational text begins with the identification of individual content elements, the search for the essence of the problem, contradictions, their causes and possible negative consequences. Practicing the skills of systemic, correlation, factorial, statistical and other types of analysis allows you to come to your own conclusions and solutions from a problem situation.

When conducting a lesson with case study, additional options for student work can be applied. The teacher tells the students about the technology of situation analysis by the "incident" method, 15 - 20 minutes is given, and each team works out its own version of the situation (from a book, practical activities of enterprises, etc.). After the situations for all teams have been developed, the procedure for collecting information begins: "incident" ("It was happened ..."); Questions and answers; decision-making; presentation of the solution and its analysis by the authors of the situation. Then another command proceeds in the same order.

The procedure with the situation work is following: having read the description of the problem (case) the student analyzes the situation independently, diagnoses the problem and presents his ideas and solutions in the process of discussion with other students. If the acquaintance with the problem occurs in the classroom, it usually takes from 10 to 30 minutes to analysis individually depending on the volume of the material. During the analysis of the situation, students learn to act "in a team", to carry out multidimensional analysis and make decisions. Typically, it takes from 30 minutes to 2 hours of study time for considering the situations.

The teacher controls the situation and acts as a coordinator and leader of the discussion, and, as an opponent and critic, activating and guiding the discussion if necessary. It is most expedient to organize a preliminary discussion by brainstorming between the participants of the analysis.

The facilitator monitors the progress of the educational game, strictly controls every action of the participants. In cases of deviations from the rules, he carefully corrects them. In the course of the learning environment that has arisen, he often introduces additional information that complicates the clinical situation. During the educational game, the participants are allowed to discuss the role of each symptom in the diagnosis of an infectious

agent of the disease, discuss the plan for the upcoming examination of patients. Summing up the results of the practical lesson, the teacher gives an objective assessment of the actions of each participant in the game, comments on the answers and corrects the survey plan. Acting as an arbiter, he dwells in detail on the mistakes of students ("players") and gives advice on how to eliminate them [7].

Assessment cases are traditionally used in teaching medical students at the stages of midterm and final control.

An example of a case study on the topic “Microorganisms and the environment. Chemotherapy drugs and antibiotics. "

In July 2018 a culture of a sanitary indicative microorganism was isolated from a liquid dosage form during the production control at the enterprise " APTEKA",.

The laboratory assistant described the following properties of the isolated microorganism: bacteria were isolated on meat-peptone agar, giving mucous-pigmented colonies that stain the medium green. On microscopy, these were to be gram-negative rods. The enterprise uses a water supply for distilled water, which was used to prepare this dosage form.

- What kind of bacteria can we think of? Is it acceptable in this in the preparation?
- How could these bacteria get into the antibiotic emulsion?
- How could the source of microbial contamination of a preparation be identified?

Response standards are not provided, since the specification of the response is not possible.

The experience of using the case study method in the practice of teaching students of medical universities has shown its high efficiency, especially for developing structuring information skills and identifying problems.

In the course of teaching students of Bukhara State Medical Institute by case study method, the following results were obtained. It had been found that interactive teaching methods, in contrast to traditional ones, generally more effectively influence the process of mastering a complex of clinical knowledge. In addition, they were clearly distinguished by the individual nature of the impact on the formation of generally known levels of knowledge. So, if traditional teaching methods influenced the development of mainly initial I (knowledge - acquaintance) and II (knowledge - copy) levels, then interactive methods of teaching to more advanced III (knowledge - skill) and IV (knowledge - creativity) their forms.

It should be mentioned, that the successful implementation of the educational clinical game "case study" requires a large amount of knowledge in fundamental medical disciplines, as well as mastery of a wide range of manipulations. This was due to the condition of collecting subjective and objective information, which is the closest to the real clinical setting. It should be noted that the educational clinical game "case study" aroused increased interest of all participants. The knowledge gained with the help of this type of educational game was much perfect and corresponded to level III (knowledge - skill), and even IV (knowledge - transformation). More than half of the participants in the game clearly developed elements of III (knowledge-skill), and the rest of the IV level (knowledge-creativity) knowledge. At the same time, the bank of clinical knowledge was enriched much faster, which is an important and distinctive advantage of this method of teaching [5].

In the holy book of King Solomon, there are words that explain the benefits of cooperation and mutual assistance: “Two are better than one; their hard work is worthily rewarded. If one falls, the other will help him to rise ... Two will defeat the one with whom none of them can cope alone. «The main idea of technologies, both brainstorming and case study, is to create conditions for active joint activities of students in various educational and practical situations. At the same time, the methods of work are joint activity, search for an answer (solution of a practical problem), a teacher and students. All this contributes to the development of effective communications in the process of collective search and justification for solving practical problems. Thus, this will affect productively on the training of creatively thinking specialists who will stay relevant in future, due to their preparedness, for a quick and high-quality solution of the problems they will have to face in their professional practice.

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