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## FORMS OF STUDENT SCIENTIFIC GROUP WORK WITHIN THE SYSTEM OF PROBLEM-BASED LEARNING

**Abstract.** *In the present article we discuss the role of problem-based learning, namely games in out-of-class student scientific research. The authors analyze means and methods of conducting this type of scientific research within the framework of scientific society of Internal Medicine, Clinical Pharmacology and Occupational Diseases department. Thus students get assistance with broadening their concept of the world, developing skills to apply theoretical knowledge and modern scientific research methods in practical context, which are of great importance for acquiring professional skills and further scientific research of students after University graduation.*

**Keywords:** *games, problem-based learning, scientific-research work, student scientific society, student.*

World Health Organization defines a modern doctor as a person who helps, makes decisions, communicates, manages and takes into consideration interests and needs of the society. As a future specialist graduating from higher educational establishment has to be highly competitive on the market, the main aim of scientific, scientific-technological and innovative policy of the educational system is to provide training for specialists, scientific and scientific-pedagogical staff to use their educational, scientific and creative potential in full to benefit the economy.

Medical students graduating from University must possess necessary knowledge and be able to acquire new scientific awareness and skills to diagnose. But what is more important to have a logical and quick methodology for finding necessary information, thus, introducing a new and unique “way of functioning”. Due to the doubling of knowledge in the world every 12 months it is no longer useful to simply memorize. Modern speed of life, information flows and scientific integration require constant learning. This process is formed by a doctor himself after he gets necessary skills in college. These skills are based on the idea of competitiveness and changing demands of nowadays. One of the main

approaches in teaching-learning process that ensures all skills mentioned above is problem-based learning (PBL) (Beylefeld A. & Struwig M., 2007, p. 933). As any other method it has its pros and cons and is not always appropriate. Self-education, practical skills acquiring, content instead of facts, team work are all advantages that teachers have to use in classrooms. Among disadvantages one should mention greater time span needed, certain level of expertise and motivation required. PBL is much spoken about in scientific papers and methodology works. Today we would like to discuss our experience in problem-based learning within the framework of student scientific research work.

One component of qualitative education formation and professional development of a doctor in all higher educational establishments in Ukraine as well as in medical institutions is scientific research work (SRW) of students. SRW includes systematic participation in research activities, teaching students methodology and methods of research, acquiring necessary skills and technologies, modeling creative approach to solving certain scientific problems (Sirenko Yu.I., 2015, p. 594). In Ukraine students’ SRW is based on a certain legislative basis namely the Law of Ukraine “About Scientific and Scientific-

Technological Activity" (2014) and the Law "About the Higher Education" (2014). SRW includes two tightly connected aspects: 1) teaching elements of research activities, organization and methods of such activities; 2) carrying out research activities by students under the supervision of professors and teachers.

Another subdivision of SRW is based on time of these activities: inclass activities that are incorporated into the teaching-learning process and activities that students carry out outside the classroom. Inclass SRW includes such kinds as a) students' groups and societies functioning within departments; b) participation in scientific-research work within department research areas; c) presentations of reports on scientific conferences in higher educational establishments; d) participation in institutional, interinstitutional, regional and national Olympiads and conferences (Sirenko Yu.I., 2015, p. 594). The most consistent and thus profitable kind of SRW activities is students' groups and societies.

Student Scientific Group (SSG) is an organizational formation at the department, the participants of which constitute a wide range of students of the university, and which is formed taking into account scientific activities of the department and in accordance with the thematic plans of the department (Beylefeld A. & Struwig M., 2007, p. 933). SSG functioning is guided by the Constitution of Ukraine, current legislation and the Regulations of the Student Scientific Society of Higher Educational Institution. Scientific societies at the university departments are created with the purpose of realization of creative scientific potential of students and their participation in research works and programs worked on at the University, as well as for the purpose of fulfilling scientific, educational and creative professional activities.

The aims of student scientific societies and groups are:

1. Finding the most potential and talented students capable of carrying out the research work;
2. Broaden the research activities of the department with students' work;
3. Developing students' skills of carrying scientific research work;
4. Attracting talented students to scientific

activities.

The major tasks of students' scientific societies and groups are:

1. Attracting students interested in scientific and research work to participate in department research;
2. Organizing scientific-research work of students;
3. In-depth studying of the chosen subject by students.

Thus, SRW allows scientists to find and guide those students who have talents and motivation for raising their professional and medical skills, to develop their methodological and organizational talents. SRW offers students various methods of developing the above-mentioned qualities, namely, regular clinical trials with experienced instructors, night shifts in the clinic, participation in competitions and in multidisciplinary conferences, presentations, travelling to other cities and countries for study.

Authors' experience in SRW was formed after many years of practice and allows to share some main principles. First of all, the main direction of the society is defined by the chair of the department and is agreed by the staff, individual students are managed by a teacher/professor in charge of SSG. SSG is formed by the students of different specializations, such as "General Medicine", "Pediatrics", "Medical Psychology" etc. Society meetings are held twice a month, with each subsequent meeting held by another lecturer/teacher. Interesting and crucial topics of meetings are chosen by teachers, which allow students to listen, study, get the most up-to-date information on this subject. Therefore, before the beginning of the academic year, an annual plan of the work of the SSG is drawn up, in which all topics, mentors of the meeting (they should be teachers having a Ph.D. or Doctor of Medical Science degree), and forms of student work are specified. As to the forms we mainly differentiate between seminars, scientific debates, workshops, individual work in the clinic, etc.

This is just a short extract to understand the way SSG is organized. Traditional methods are not ignored in the schedule, allowing students and mentors to practice more usual forms like debates, mini-lectures, presentations etc.

As to the preparation the materials of meetings

are created by mentors and are guided by the principle of the unity of theory and practice. At the beginning of the meeting a mentor gives a mini-lecture, thus introducing students to a chosen topic, articulating the aim and plan of the meeting, and briefly highlighting current scientific aspects of the topic (Bistrova Yu.V., 2015). Subsequently one or two students (who previously received the task to independently work out the most significant achievements in diagnostics or treatment of a given illness) in the form of a presentation or abstract share their knowledge on this topic. A student, who prepares a speech for a society meeting, spends his own time and is responsible for the quality of information he presents. This enables the student to develop important qualities for a future doctor-researcher – creative thinking, responsibility and ability to defend one's point of view. This prior preparation allows students to participate in a lively discussion at each meeting to analyze modern aspects of pathogenesis and differential diagnostics, students eagerly share issues of clinical pharmacology, pharmacotherapy and differentiated treatment of diseases of internal organs. But society's aim is not limited to forming theoretical basis for students. It is also recommended to use clinic patients' cases to deepen theoretical knowledge, work out the skills of collecting a medical history, clinical examination, conducting and analyzing the results of instrumental research methods, mastering the methodology of choosing optimal medicine and conditions for its rational use for each individual patient. This practice is provided by night shifts, medical cards processing, examining patients etc. As an important step the post analysis is carried out by students together with their mentors. This analysis includes perspective and retrospective perspective discussion of medical appointments from medical cards of patients, assessment of the quality of pharmacotherapy from the point of view of rationality, compliance with the protocols of medical care for patients with various diseases, interactions, completeness of appointments, detection or prediction of probable side effects of drugs, errors in the appointment of combination therapy, suggestion of ways to correct them, and work with scientific literature.

One of the most beneficial forms of SRW is

workshops. Speaking about Internal Medicine department workshops are usually held on topics of cardiology, pulmonology, gastroenterology and hematology. Mentors who organize these workshops conduct them together with practical doctors of clinics. Thus, workshops on pulmonology are carried out in the office of functional diagnostics of a clinic, which gives an opportunity to show the method of spirometry, pneumothachometry. While having a workshop on cardiology students are able to conduct electrocardiography and interpret it. Department of Fetal and Blood Transfusion of the Emergency Hospital allows students of Scientific Society to master the basics of transfusion medicine in practice. Gastroenterological workshops are based on students' solving clinical problems of liver diseases in the form of simulation games.

Unusual format of conducting, the opportunity to independently establish a diagnosis, make a plan and suggest a treatment scheme motivate students to work hard and go beyond textbooks and lectures. Additional laboratory and instrumental means (mentors are to provide students with all necessary data upon request) help to embody theoretical knowledge into practical skills, promote increased urge to study.

A game is a method often used within the scientific society program scope. A game can be defined as an activity with entertaining aspect directed by strict rules united by certain strategies for one or more members cooperating or competing with each other using their skills and knowledge to attain a set goal (Denina R.V., 2015, p. 282).

Games can be used successfully at different stages of teaching process: starting with material presentation up to acquiring more complex skills and their further synthesis as well as evaluation and application. The answer to the question why games are successful lies in the regression to earlier stages of personality development when learning and acquisition are natural for human beings. Students mentally are taken back to their childhood where they are free from stereotypes and restrictions, free from fear to make mistakes. They are immersed into environment of unstressed trying, low responsibility, necessary cooperation and friendly support. Simultaneously games are dynamic and diverse, thus suggesting

high motivation and enthusiasm level.

Here are some cases of games used within the scope of SSG schedule.

Case #1.

Scientific Society Meeting

Topic: 'Peculiarities of Examining and Treating Patients with Chest Pain'

Format: consultation with medical experts

Number of Students: 12

Aim: to acquire skills of diagnosing and choosing correct treatment

Preliminary Stage: Students are given lists of illnesses that may cause chest pain. Illnesses are studied at earlier courses. Every student is also given a diagnosis for which they have to a) make a list of complains, b) develop analyses results, c) prepare additional information like anamnesis etc.

Main Stage: In turns students play roles of patients consulting with a group of medical experts revealing the story of the illness. His colleagues join their efforts to diagnose a patient and choose the best treatment. Correct answers, involvement, asking related questions and ability to follow the procedure are all keys to success.

Evaluation: Evaluation takes place after all students get their diagnoses and treatment. It is the responsibility of a teacher not only to evaluate, but also to discuss the activity with all members, point out strong and weak issues of each participant.

Quest game is another case we would like to present within the society program. During this type of activity theoretical knowledge and information easily transform to practical skills, associations necessary for forming a future professional are formed. The process of this game includes a system of clues and tasks connected with topic under discussion (Chornovol-Tkachenko O.O., 2009, p. 123). They are hidden in different clinical departments of the hospital, when deciphering or solving one task leads to a new place for getting another clinical problem to solve. Evaluation is on the teacher and correct answers as well as promptness in problem solving are taken into consideration. The final stage of the quest is discussion with participants and evaluation. Below an example of quest game used at the scientific society is given.

Case # 2

Scientific Society Meeting

Topic: 'Treatment of Patients with Chest Pain'

Format: quest game

Number of Students: 10-12

Aim: after getting all pieces of information about complaints, symptoms and examination results to diagnose and appoint a correct treatment

Preliminary Stage: Before the game starts pieces of clinical task are placed in different departments and wards (Cardiac Department, X-ray, USD department etc) All students from two teams.

Main stage: Each group is given a clue (a format can be a riddle, a word etc.) which points to a place with the first task. If the task is not solved within a certain period of time a teacher supplies an easier clue. After completing a task a group is given another one to solve or find a place. All pieces of solved tasks are brought together to form a clinical picture of the case.

Evaluation: A teacher carries out evaluation. All aspects of work are taken into consideration. Quest games are followed up by a discussion.

We would like to point out from our experience that this method allows students to experience active learning and is a method for creativity and attention development. Quest games are good for effective forming and reinforcing skills of medical students. They also include other methods for expanding their teaching possibilities.

In addition one should also bear in mind the possibilities provided by methods used while playing quest games. Among them brainstorming should be mentioned. It allows students to feel free while expressing their ideas, thus ensuring formation of skills like concentration, self-assurance, responsibility for your decision and ability to prove one's point of view.

As the outcome of student's work during the year in SSG we offer student's participation in Annual International Medical and Pharmaceutical Congress of Students and Young Scientists. Also students share their scientific achievements at conferences, congresses and congresses in Ukraine and other European countries. This, in turn, forms oratory skills, the ability to independently think and make decisions, participate in discussions, answer the questions, defend their views on the problem. The results of

scientific research are reflected in the publications in various journals, collections of scientific works of students and young scientists. Conferences and congresses are perfect means of getting future doctors see and accept various approaches and develop tolerant attitude. This is another aspect that should be taken into consideration while mentoring CIS: mentors within pedagogical ethics have to encourage students to form their professionalism, humanity, justice, mutual respect and personal dignity.

Students work on understanding the main deontological principles of the medical profession, having a sympathetic attitude to the patient and his relatives. Mentors emphasize that a benevolent attitude towards the patient, a sedative word of a doctor or psychologist, encouraging information are powerful means of mobilizing the protective forces of the patient's body to recover.

Thus, we would like to conclude the following:

1. Problem-based learning applied in Student Scientific Group helps to develop critical, creative and analytical thinking, develop the ability to apply theoretical knowledge and modern methods in practical activity.

2. Experience in SSC participation helps to acquire skills in independent scientific research work and improve quality of Internal Medicine studying.

3. Students taking part in SSC get possibility to master the chosen specialty, acquire necessary research skills to proceed with scientific research work after graduation.

4. Games being a part of PBL are successful and beneficial method that can be used for out-of-

class SSG meetings.

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