PEDAGOGY

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Team building in training medical and biological physics

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Abstract. The article deals with the problem of the use of interactive pedagogical technologies, namely, collective professional games as a team building by training future doctors in medical and biological physics. Beside the analysis of theoretical pedagogical and psychological foundations of the problem, the scenario of a team building business clinical game by studying the topic "Effects of currents and electromagnetic fields on body tissues" has been elaborated.

Keywords: medical and biological physics; interactive pedagogical technology; business clinical game; team building

The problem of improving the scientific, theoretical and practical training of future specialists, particularly, in physical disciplines, is one of the most important in the world and national professional education [1]. Modern society has fundamental educational needs in forming personality, capable of self-development and self-improvement; individual, which would be able to adapt to rapidly changing social and technological conditions, with a high intellectual and creative potential, also able to use the acquired knowledge in order to solve applied problems and to produce new knowledge. The quality of professional education not only involves the formation of specialized knowledge for direct access to the labor market, but also building-up of effective long-term knowledge, which trends to update the content and efficiency of training, leads to the improvement of the learning forms. In studying professionally oriented aspects of physics the most important is an acquisition of skills for the adaptation of fundamental knowledge to solve professional problems. This can be implemented using the so-called "activity approach", which was founded over a century ago by John Dewey and gained great popularity in recent years. This approach is based on the premise: "Knowledge cannot be given, one can master it, when students perform certain activities" [13].

Nowadays, it is assumed that the use of interactive teaching methods makes it possible to increase the percentage of learning and acquirement of material under study. The so-called "pyramid of training" [7] states, that the percentage of knowledge acquirement is substantially higher by discussion in groups, practice through the action and especially – teaching of others, application of acquired knowledge at once, rather then by lecture, reading and demonstration.

The most common form of interactive teaching, training and personal development is a game. The analysis of recent research and publications allows to conclude that the research of scientists who have studied the theoretical and practical (educational, psychological, social, psychological, methodological) aspects of innovation was devoted to problems of the use of game technologies in the teaching and learning process. Among others the game technologies in education are viewed in the sense of educational innovation (T. Kalashnikova), in the training system of competitive specialists (M. Vorovka), as an inten-sive educational technology (V. Traynyev) etc. Scientists and practicing teachers focus their studies on specific areas of study of methodology and practice of a game as means of the socialization, the transition from theory to practice, heuristic learning activities, forming of logical thinking and skills of students, enhancement of their learning activities and of the professional training level etc [10].

Theoretical and methodological foundations of interactive education, effectiveness of its impact on the personal identity formation are analyzed in the works of I. Avdeev, M.V. Klarion, O. Pometun, L. Pyrozhenko, A. Piechota, N. Pobirchenko, G. Selevko, S. Sysoev, P. Sidorenko, P. Scherban and others.

To the games that are used in training and education belong: business, role, didactic, simulation-modeling ones [6].

The teambuilding is one of the most important processes by providing of any collective activity and educational as well.

According to the mostly used definition, team building is an effort in which a team studies its own process of working together and acts to create a climate that encourages and values the contributions of team members. Their energies are directed toward problem solving, task effectiveness, and maximizing the use of all members' resources to achieve the team's purpose. According to J. Dyer, team building was originally a group process intervention aimed at improving interpersonal relations and social interactions and has developed to include achieving results, meeting goals, and accomplishing tasks. It refers to the activities in which teams can engage to change its context, composition or team competencies to improve performance.

Team building is pursued via a variety of practices, and can range from simple bonding exercises to complex simulations and multi-day team building retreats designed to develop a team (including group assessment and group-dynamic games), usually falling somewhere in between. It generally sits within the theory and practice of organizational development, but can also be applied to school groups and other contexts. Team building is said to have benefits of self-development, positive communication, leadership skills and the ability to work closely together as a team to solve problems [3].

The components of the process of teambuilding are:

1. Formation and development of teamwork skills, which are the basis of the introduction of team management. This could include the following skills:
• harmonization of the common objectives with personal;
• taking responsibility for the outcome of the team;
• situational leadership (leadership for the given task) and flexible change of style in accordance with the characteristics of the problem;
• constructive engagement and self-management;
• adoption of a unified team decision and its coordination with team members

2. Formation of team spirit, i.e. the set of psychological phenomena that characterize the informal relationship to fellow employees and the organization. The development of team spirit, in fact, is a complex of measures aimed at:
• gaining of a sense of unity, formation of a stable sense of "we";
• development of trust between employees, understanding and acceptance of the individual characteristics of each other,
• creation of motivation to work together;
• creation of high-performance experience of joint actions;
• improving informal authority of managers;
• development of loyalty of participants in relation to the organization.

3. Team building is a mechanical action on the selection, optimization of the structure and functional-team role distribution aimed at:
• effective use of the strengths of a team;
• the distribution of roles in the team for optimal results;
• establishing horizontal links within the team.
Also, under the teambuilding process we understand an intra-collective process in order to improve the team unity based on shared values and beliefs. Its goals are:
• building the skills of successful interaction of team members in different situations;
• increased level of personal responsibility for the outcome;
• transition from competition to cooperation;
• increasing the level of trust and care between team members;
• switching the attention from the participants on the team;
• improving of team spirit, getting a positive mood.

In the highly competitive Western countries in the mid 70s, experts have concluded that, along with motivation, personnel selection and training, one of the components of high efficiency, is harmonious work or "teamwork" of team members.

Processes occurring in the groups of people, united by common objectives, were the subject of the study not only of social psychology, but psychology of management. A number of experts in all countries are engaged in the study of human interaction, role position, group dynamics, and other psychological processes occurring within the working groups. Understanding of this has allowed to develop methodological basis of training techniques that solve the problem of communication, interaction, and psychological climate within the team. This chapter of the training programs has a common name «teambuilding».

In course of this process the employees learn to:

• understand the advantages and principles of teamwork;
• improve communication between them;
• take collective decisions in the given circumstances;
• be aware of their role and the other team members in real time;
Finally they simply have fun.
By the classroom teambuilding a role play is used [4].
By the classroom teambuilding in the teaching of medical and biological physics the practical business game is also widely used.

The business clinical game (BCG) is one of the leading forms of active learning at the medical university, which allows to train by a specialist not only professional, but also communication skills [9].

The review of available literature revealed the widespread use of game technologies for training future doctors in the study of clinical subjects for senior students who already perceive themselves in their future profession. The use of these technologies in the teaching of basic fundamental sciences to junior students was not found in course of our review.

The object of our study is the team building as the method used in the training of medical and biological physics, that is an important part in professional training of future doctors [2; 14].

The aim of the paper is to research the essence of teambuilding used in the study, and to define the features of its use in the higher medical education.

The teamwork and playing situations in roles simulates the reality by role definition for participants and enables them to act "like in a reality." Each person in the team play has to clearly know the relevance of his or her role and purpose of the role play at all.

The goal of a team play is to clarify the attitudes to a particular situation in life, to gain experience through the game, to help learning through experience and feelings, to learn to understand the principles of a teamwork, to improve communication among themselves and to be aware of their roles and the roles of other team members.

The role play can be also used to obtain specific skills, such as safe behavior in certain situations, etc. [11].

The relevance of this study is a combination of theoretical disciplines (medical and biological physics) and the process of professional training of future doctors. In addition, the contents of these courses taught in a high school are often personality-alienated from a future specialist, i.e. they are detached from personally meaningful, experienced, assigned things. In the process of learning the game is the inclusion of students in scientific model of theory of a professional activity, that transforms it into an educational simulation model. The student enters the world of an educational game, as in real life, begins to act, knowing the invisible line between reality and convention, adopts the best examples to the professional action, produces more efficient versions of professional activity, that helps him searching the sense and the forming his or her professional competence [10].

Therefore, the modelling of profession in terms of role plays provides the opportunity to obtain practical skills, allowing even before the direct medical practice, to transform the knowledge gained during the study of some theoretical subjects into a complex system of professional

action, encourages to explore the basics of professionalism.

We offer the use of a team building role-play during the seminars on "Effects of currents and electromagnetic fields on body tissues" within the teaching of medical and biological physics to the first year students of the National Medical AA Bohomolets University and the Ivano-Frankivsk National Medical University.

The teambuilding success depends on the effectiveness and structure and provides an implementation of the following basic steps:

1. Preparation for the classes in a game form, containing definition of the goal of the game and its time limit; establishing compliance with its content in the context of study and the topics of classes; development of the own or adaptation of given script of the game; the minute stage structuring of a game interaction (motivation, activity, reflection, control, assessment); providing of the necessary equipment and materials; development of clear step-by-step instructions for students - members of the game interaction (goal, objectives, rules, game actions, conditions).

2. Immediate game that involves the activities of learners as an expression of their internal (psychological), external (physical) and social (professionally oriented) activity. The activity is regulated by the perceived purpose and has the following features: prediction of results; awareness of the possibility of their achievement; motivated planning of actions; rational selection of appropriate forms, methods, tools and guidelines in interpersonal relationships; harmonization of internal and external activities; evaluation process and results of the work that needs certain skills to standardize, consider, control, make better decisions, solve general organizational tasks (diagnose, predict, activity-stimulating approach: comprehensive, systematic, holistic) and allows students to check the feasibility of activity and its correspondence to a set purpose.

3. Analytical evaluation phase, which involves reflection, summarizing the results of the game, drawing conclusions, determining by students of the positive aspects of the game performance for their personal professional growth in the future and statement by teachers of errors, omissions, ways to improve the game interaction of students for the future use of tested techniques [10].

At the preparatory stage, students are offered the following scenario. The events take place in the clinic in the physiotherapy room. The list of available physical therapy equipment is announced (device for galvanization and electrophoresis, apparatus for UHF-therapy, magniter, device for darsonvalization). Students are encouraged to be divided into groups of 3-4 people to work with one of the devices and to choose one or two coordinators from the academic group. Each group gets a job to play with the proposed device as widely as possible (collect all available information on the structure, the physical basis of influence, technology and use in medicine, indications and contraindications for use) and to convey as much as possible the information to colleagues.

Within each group the roles are defined as follows:
– Patient (asking questions about feeling the impact, the duration and outcome of treatment);
– Nurse (tells about the structure of the device, provides physiotherapy, talks about other methods);

– Physician (talks about the therapeutic effect of the device, the physical basis of therapeutic effects, indications and contraindications).

Besides, the additions of other persons is possible, such as relatives of patients, which makes the game much closer to reality. The age of patients is not restricted, from child to old, and relatives of the patient play the role of a "devil's advocate", asking uncomfortable questions, being skeptical of the procedure.

The coordinator has to talk about the general characteristics of the effect of different types of electric current, electric and magnetic fields on the human body, to prepare questions for the final survey of all groups on a "microphone".

The "mice" gives everyone the opportunity to say something quickly, one by one, answering questions or expressing their opinions or positions. The rules are following:
– One, who has a symbolic microphone, is talking;
– The answers are not interpreted or evaluated;
– When someone is speaking, others have no right to interrupt, to say something, to shout from their places [11].

By the direct conduct of the game, students can use any aids – equipment manuals, posters, presentations, technical teaching aids, forms, tables, handouts, flip charts, markers, whiteboard, colored chalk. But they should always follow the rules of the game:
– Respect anything that your colleagues make;
– Do not exceed the given time limit;
– Strictly follow the role;
– Try to treat your role as a real life situation in which you are involved;
– Do not comment on other activities while in role;
– Try to listen to partners and teachers;
– Leave the role at the end of a scene;
– Participate in the analysis [11].

On the third analytical and evaluative stage students, when left the role, become observers and evaluate their work and the work of their colleagues. To do this, students are issued a questionnaire for self-assessment and to assess others.

The following form provides an opportunity to evaluate the work of a small group by its participants. You can just put the icon (e.g. X) in the box, noting how did the group work as a whole or inscribe the names of the group members.

Indicators: Always Never Sometimes Usually

We checked if all group members understood what to do.

We answered questions, giving explanations, when it was needed.

We found out, what was not clear for us.

We helped each other so that everyone could understand and put into practice the information that we received.

We provided an opportunity for all to participate in the discussion, decision and present the results of the group

Signatures of members: _____ [11].

To evaluate the work of other groups and presentation of a material, when the students left their roles and became observers, they are asked to answer the following questions.

–Your colleagues performed the task of __%;
– Your colleagues have demonstrated practical application of acquired skills at __%;
– Presentations prepared by your colleagues helped to __%;
– Performing the roles was successful to __%;
– You remembered materials set by your colleagues to __%.

The self-assessment is an alternative assessment, the purpose of which is to broaden the evaluation field, to include in it the analysis of new skills and values that were formed by students.

However, it should be remembered that the self-assessment does not provide an alternative to overcome the subjectivity of evaluation. We believe that the evaluation of students' achievements should have a triple nature, except for the two methods of self-assessment described above the teacher also plays an important role. This eval-uation provides evidence that the interaction achieves high-quality learning outcomes. When grading the teacher should show students that they have reached the goal of a class, mark the best results of self- assessment, stimulate motivation to learn and gain knowledge.

Based on the above, we can assume that the use of teambuilding in teaching medical and biological physics to future physicians promotes the better learning of theory, developing abilities and skills for different types of future careers, creates self-educational skills, encourages students to the collective creative work, develops an initiative, independence, responsibility, and allows students to gain their own experience and to share it with others.

The development of interactive techniques and types of assignments for teaching medical and biological physics to future doctors is the subject of our further educational research.

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Чалый А.В., Стучинская Н.В., Остапович Н.В. Тимбилдинг в обучении медицинской и биологической физике
Аннотация. В статье рассмотрена проблема использования интерактивных педагогических технологий – групповых деловых игр в качестве тимбилдинга при обучении будущих врачей медицинской и биологической физике. Кроме анализа теоретических педагогических и психологических основ проблемы, разработан сценарий тимбилдинговой деловой клинической игры при изучении темы "Влияние тока и электромагнитных полей на ткани организма".

Ключевые слова: медицинская и биологическая физика; интерактивная педагогическая технология; деловая клиническая игра; тимбилдинг