INFLUÊNCIA DO TREINAMENTO COGNITIVO - ATIVIDADE PRÁTICA DOS ESTUDANTES SOBRE A EFICIÊNCIA DA FORMAÇÃO PROFISSIONAL NO PROCESSO DE PRÁTICA DE CAMPO EDUCATIVO SOBRE BIOLOGIA

INFLUENCE OF TRAINING OF COGNITIVE - PRACTICAL ACTIVITY OF STUDENTS ON EFFICIENCY OF PROFESSIONAL TRAINING IN THE PROCESS OF EDUCATIONAL FIELD PRACTICE ON BIOLOGY

ВЛИЯНИЕ НАПРАВЛЕННОСТИ ПОЗНАВАТЕЛЬНО – ПРАКТИЧЕСКОЙ ДЕЯТЕЛЬНОСТИ СТУДЕНТОВ НА ЭФФЕКТИВНОСТЬ ПРОФЕССИОНАЛЬНОЙ ПОДГОТОВКИ В ПРОЦЕССЕ УЧЕБНОЙ ПОЛЕВОЙ ПРАКТИКИ ПО БИОЛОГИИ

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RESUMO

A formação profissional dos alunos é muito importante para a educação. Questões sobre a influência da atividade cognitivo-prática dos alunos em uma direção: a eficiência da formação profissional no curso da prática de campo educacional é considerada no artigo. Os autores aplicaram uma abordagem funcional ao estudo das atividades dos alunos durante a prática de campo, o que permitiu determinar a natureza e a direção do trabalho realizado. Com base na classificação de nível da direção da atividade, os autores identificaram quatro níveis de trabalho educacional na preparação e condução da prática de campo (atividades cognitivas e práticas); educacional (baixa); educação e produção (abaixo da média); científica (média); científica e produtiva - um alto nível de atividade dos alunos. Com os motivos determinando as atividades cognitivo-prática no período de prática de campo, os autores identificaram 15 tipos de atividade, que são formados em 4 grupos, determinando 4 níveis de motivação. Está estabelecido que a direção da motivação para melhoria é expressa em estudantes da área científica e de produção, menos pronunciada entre os estudantes que escolheram a direção acadêmica.

Palavras-chave: *Prática de campo, orientação, motivação, eficácia, orientação processual, cognitivo-prático.*

ABSTRACT

The professional training of students is very important for education. Questions of the influence of

cognitive-practical activity of students on a direction: efficiency of vocational training in the course of educational field practice is considered in the article. The authors applied a functional approach to the study of students' activities during the field practice, which allowed determining the nature and direction of the work performed. Based on the level classification of the direction of activity, the authors identified four levels of educational work in the preparation and conduct of field practice (cognitive and practical activities); educational (low); educational and production (below average); scientific (average); scientific and production – a high level of students' activity. As the motives determining cognitive-practical activities in the period of field practice, the authors identified 15 types of activities, which were organized into 4 groups, determining 4 motivation levels. It was established that the direction of motivation for improvement is expressed in students of the scientific and production area, less pronounced among students who have chosen the academic direction.

Keywords: *field practice, orientation, motivation, effectiveness, procedural orientation, cognitive-practical activity.*

АННОТАЦИЯ

Профессиональная подготовка студентов очень важна для обучения. В статье рассматриваются вопросы влияния познавательно-практической деятельности студентов на направленности эффективность профессиональной подготовки в процессе учебной полевой практики. Авторами был применен функциональный подход к рассмотрению деятельности студентов во время полевой практики, что позволило определить характер и направление выполняемой работы. На основе уровневой классификации направленности деятельности, в подготовке и проведении полевой практики, авторами выделено четыре уровня учебно-трудовой (познавательно-практической деятельности); учебный (низкий уровень); учебно-производственный (ниже среднего); научный (средний); научно-производственный – высокий уровень направленности деятельности студентов. В качестве мотивов, определяющих познавательно-практическую деятельность в период полевой практики авторами выделено 15 видов деятельности, которые сформированы в 4 группы, определяющие 4 уровня мотивации. Установлено, что направленность мотивации на совершенствование выражена у студентов научно-производственного направления, менее выражена у студентов выбравших учебное направление.

Ключевые слова: *полевая практика, направленность, мотивация, результативность, процессуальная направленность, познавательно-практическая деятельность.*

INTRODUCTION:

Biology is the subject of a rich history, which had enormous and rapid achievements over the past few decades. In fact, it has recently been suggested that these achievements, especially in the field of genetics and genomics and cellular (in particular stem cells) biology, are so great that they require a fundamental shift in the developmental biology itself (St Johnston, 2015). The problem of teaching concepts was also suggested in the development of biology since much of what was taught can be regarded as a fact and a concept (Wood, 2009). Thus, we ask students to use this knowledge, which determines how they emit it as a factor fully evaluate it and apply it as a concept. Given these considerations, how should we ensure that students in courses of biology development and general biology, zoology or biomedical courses not only learned but also understood the principles of field studies? It is known and recognized that students learn best by doing this

and having the opportunity to apply what they have learned in practice (Kolb, 1984; Moon, 2013). A fundamental requirement for learning in the field of science is the ability to design and conduct experiments (Hofstein, 2004; Kirschner, 1992; Kirschner & Meester, 1988). By their very nature, students do not usually practice science as such, but rather learn to practice it (Adams, 2009). Therefore, scientific teaching should be aimed at acquainting students with how science works remembering that students do not have theoretical knowledge, and the experience of the researcher (Allen & Tanner, 2003; Allen & Tanner, 2005; Hmelo-Silver, 2004; Kendler & Grove, 2004). Oriented discoveries are more conducive to constructivist learning, which are purely based on the discovery of approaches and cannot correctly involve students in the material (Mayer, 2004). In short, behavioral activity is not equal to cognitive activity, and we need to be careful to understand why we force students to perform specific tasks.

Kirshner (1992) defined three motives for

practical application:

1. Service to theory – practical; used to illustrate or approve theories taught in another setting. Thus, practicality is subordinated to other forms of learning, and also obeys a theory where in fact the theory and practice are interdependent.

2. Discovery as the only way to achieve meaningful learning – practical; used to provide learning of discovery and approaches to the process in the absence of a prior theoretical context. However, this is based on the assumption that admission training cannot be meaningful.

3. As a means to rethink understanding or understanding from empirical work – practical; used to provide experience to help students understand the theory. This approach suggests that meaningful learning can take place (i.e., students can comprehend their observations) in the absence of a reliable conceptual framework.

Practical exercises are better suited for the development of specific skills, learning the academic approach and allowing students to experience phenomena (Abrahams & Millar, 2008; Collis *et al.*, 2008). The cycle of experiential learning, collaborative learning and group work allows students to perform several roles and promote the development of collaborative skills together with opportunities for group discussion and personal reflection (Kolb & Kolb, 2005).

Understanding of developmental biology is important for students of biological sciences and is vitally important for those who are engaged in the degree of zoology. It is now generally accepted that traditional lectures are poorly suited for teaching and learning in the XXI century, using active approaches to studying (Jensen & Kummer, 2015; Lage & Platt, 2008), becoming increasingly popular. The ability to conduct practical laboratory exercises places science apart from many other disciplines, and therefore it is important that they be fully used to provide the widest possible variety of active approaches to studying.

FUNCTIONAL APPROACH TO REVIEWING THE ACTIVITIES OF STUDENTS

The previously existing paradigm in the educational system of the Republic of Kazakhstan – a teacher – a study guide – a student, in which priority was on the side and behind the activities of the teacher, now does not meet the requirements of our time. It is replaced by a paradigm of education: a student – a study guide – a teacher, in which priority is given to the independent cognitive activity of the student. The role of the teacher does not become less significant, on the contrary, the organization of interactive teaching requires high qualification and professionalism on the part of the teacher; all the more, one of the factors that contribute to the formation of students' learning needs and activates their cognitive activities is the teacher's personality, their erudition, and mastery of teaching.

In the field practices of zoology, students master the skills of rational educational work, training themselves on questions and tasks, observations and experiments with natural objects, independently acquire knowledge. The experiment and observations provide the students with facts, which are then theoretically comprehended and generalized. In laboratory exercises, we require more complex training activities than observation. It includes the set of experiments with living objects, observations for the study of biological phenomena and processes.

Students study specific objects, beginning with the first classes in zoology. Specific knowledge obtained on the basis of experiments and observations is the starting point for the formation of appropriate ideas about the life of animals. By the end of the lab classes, it is important to consider a number of requirements: the trainees must understand the purpose of the experiment, master the technique of conducting it, organize observation, record the results, and comprehend the conclusions.

Experiments with animals, as a rule, are aimed at elucidating the influence of various factors on their vital activity, the development of conditioned reflexes, and require a long time to perform.

Students should clearly understand what to compare – it means to find the common, the

same for the objects in question, and what they have different, what makes them different from each other. Comparison – is an indispensable action in the study of the animal world, activates the cognitive and intellectual activity of students, increases the share of search, and increases the degree of their independence. A variety of appropriate independent activities contribute to the intellectual and moral development of students.

A functional approach to reviewing the activities of students during the field practice makes it possible to determine the nature and direction of the work performed. Each action of the student divides by its functions into three parts: orienting, executive and control. It distinguishes three basic stages of the organization of educational activity: introductory-motivational, operational-cognitive and control-evaluative.

The introductory-motivational stage is the realization of the basic educational and problem situation, which introduces into the subject of the forthcoming work, the formation of the main educational task, self-control, and self-assessment of the possibilities of the forthcoming activity for studying the educational material.

The operational-cognitive stage is the stage of generalization of the studied, the inclusion of knowledge and skills in the own system, the analysis of what has been done, the evaluation of own activities and actions, correction.

The educational process during the summer training practice was organized so that:

- everyone had the right and participated in the control, evaluation, accounting of the activities carried out by all and each individual;
- the work was addressed not to the teacher, but to all members of the group;
- the teacher is an unobtrusive organizer and leader with special rights (for final evaluation), suspension of activities, correction.

CHARACTERISTICS OF THE LEVELS OF STUDY PRACTICE

Despite the fact that the author of the training field practice tried to create optimal conditions for all participants, the results obtained by us were not always adequate to the efforts

expended. This served as a starting point for the return to psychological readiness for activity from the position of studying its orientation. At the heart of the direction of activity lies the system of dominant motives and the orientation object. Was developed a typology of groups of motives for educational work and cognitive-practical activity: *productive; aimed at communication; procedural; aimed at improving labor*. In each group, the motives that motivate the performance of activities, directing this process and expressing the attitude towards it are highlighted.

In the "*productive*" group - it is the obtaining of the result, bringing the matter to an end, the motives expressing the focus on the qualitative and quantitative characteristics of the product, the attitude to moral and material encouragement.

In the "*communication*" group - the motives, oriented to cooperation with the society as a whole, its individual representatives (peers, leader, parents about activities).

The "*procedural*" group is distinguished by motives aimed at the process of labor, its physical characteristics, active operation with the means of activity, the performance of the role duties of a member of the collective.

The "*improvement*" group was composed of the motives aimed at improving knowledge about the subject, skills, and methods of work, relationships in the team, the individual in the process of labor (the formation of new personality qualities).

The above-mentioned groups of motives are ranked in the hierarchical table in order of importance for the formation of the individual stability with respect to work activity in the following sequence: directed at the process of labor (the learning process) – low level; the focus on communication – below average; effective focus – average; the focus on improving labor – high level.

The levels of activity orientation shown above are characterized by some of the following personal qualities:

- procedural: negative attitude to the tension of labor, no desire for leadership, irresponsibility, passivity, lack of initiative and others;
- direction for communication: sociability, emotionality, cheerfulness, aspiration for leadership, mutual assistance;
- resultative orientation: conscientious attitude to work, responsibility, awareness of the

social significance of labor, independence, activity, creativity, diligence, endurance, economy, organized nature, ability to cooperate, mutual assistance;

- direction for the improvement of labor is characterized by diligence, activity, interest in the results of labor, the desire for improvement, cooperation, mutual assistance, a high awareness of the social significance of labor.

In the preparation and conduct of the training practice, we have identified *four levels of educational-labor (cognitive-practical activity)*: educational (low); educational and production (below average); scientific (average); scientific and production – a high level of students' activity orientation.

The main purpose of the curricular level of the activity orientation is the development of practical skills and the consolidation of theoretical material.

The purpose of the educational and production level is to consolidate the theoretical material, develop practical skills, use them in obtaining products, calculate economic efficiency, material compensation.

The purpose of the scientific and research direction was to study previously unexplored issues or requiring practical recommendations.

The research and production direction made it possible to combine research (study) with practical results-obtaining a product, calculating economic efficiency, material compensation.

ANALYSIS OF THE MAIN PARAMETERS THAT AFFECT THE COGNITIVE-PRACTICAL ACTIVITY OF STUDENTS

The main parameters for ranking and determining the level of activity orientation were:

1. During the introductory and motivational stage:
 - formation of creative groups (main motives);
 - determination of the problem of the forthcoming work;
 - selection of topic, the object of research;
 - determination of the work's purpose, the main tasks.
2. Operational and cognitive stage:
 - construction of the technological plan (particular tasks of the work);

- resolution of accepted tasks.
- 3. Control and evaluation stage:
 - conducting the results of practice;
 - evaluation of activities.

As the motives determining cognitive-practical activity during field practice, we identified 15 types of activities that can be grouped into four groups that determine four levels of activity motivation. Assuming that motivation determines the basic attitude to activity, then a similar level of activity will correspond to a certain level of motivation (Table 1).

By sequential ranking, we determined the place of a certain level of directivity in the process of activity, their correlation and the changes that occur.

Activity focus: P-procedural; C-communication; I-improvement; E-effectiveness; / - occurring changes.

When choosing the problem, the effective focus dominated to obtain a real result. The procedural direction is in the second place, this indicates that the heterogeneity of the direction of activity is clearly visible already at the first stage; dividing into two groups approximately equal in number. This distribution is further preserved when selecting the object of the forthcoming work. There are two dominant motivations of activity: effective and focused on improving labor. The selection of groups took place mainly on the basis of emotionally and personal communication (Table 2).

The preliminary results were to create a favorable picture of the forthcoming practice: six groups with an effective focus of cognitive and practical activities, one aimed at improving labor and four with a process focus, requiring increased attention on the part of teachers and more in-depth preparatory work for the successful implementation of EFP and effective use of time.

At the end of the study practice, changes occurred in the manifestation of the level of activity: two groups with a high level, six with an average level and four with a low level of activity.

We tried to explain the changes that arose from different points of view, including the impact of the stability of activity motivation.

The study of the existence of correlations between the sustainability of motivation and the creative nature of activities is conducted and linked to the effectiveness of performing creative tasks. The results obtained by us show that motivation is a factor that ensures the success of

the task, requiring creative initiative and activity.

As the results of the analysis shows, levels of motivation "below average" and "low" have low indicators in the educational direction, therefore, they will not play a decisive role in determining the motivation of the activity.

The decisive role in the educational and production direction belongs to the high and medium level of motivation; average and below average – in the scientific and research direction. Numerical indices of motivation in the scientific and production direction of activity are lower than in the control (educational) and all other areas of activity. According to the focus on the result of the activity, the scientific and production area (0.7) is on the first place, followed by the scientific and research (0.51), educational (0.35).

The direction of motivation for the result of activity in the educational and production direction, perhaps this is due to the uncertainty in achieving high practical results. The direction of motivation for improvement is expressed in students of the scientific and production field, less pronounced in those who chose the educational direction.

Following the practice, the following results were obtained:

- one group (9.1%) of students confirmed their level of activity orientation, their coefficient is 1;
- in two groups (18.2%) the coefficient of significance is much higher than previously stated, which indicates that the opportunities of students were more fully revealed;
- in one group with a low initial value, the level of directionality increased numerically, this again proves the positive effect of the study practice on the formation of the level of the activity orientation;
- the group (9.1%), which had a coefficient close to 1 at the beginning of the practice, did not show a high level of activity orientation, its level after EFP was close to low (procedural);
- the value of the significant coefficient in the three groups, which had a low initial value, decreased even more.

So, the numerical value of the indicator of the importance of the activity orientation increased in the majority (63.7) of students, for the rest of the mass the value of this indicator decreased, in comparison with what was

declared by the students themselves (the method of self-assessment of the calculated motivation of activity) (Tab.2). The obtained results confirm the assertion that the activity level calculated by the self-assessment method does not always correspond to the present level. The reason for this may be a discrepancy between the dominant motivations of activity and the objective goals of studying.

CONCLUSION:

Self-study is a factor that ensures the success of the task, requiring creative activity and initiative. The steady motivation for intense cognitive-practical activity fosters a habit of intense creative work; the need for it is a necessary condition for full-fledged psychological preparation for inclusion in a holistic work process. No task received by groups for the period of educational field practice implies simple mechanical performance of any operations; all required a different level of creativity. But only 18.25% of students showed a high level of activity orientation, have a full psychological preparation for inclusion in the process of future professional activity to a certain extent.

If the dominant motive and objective goals do not coincide, the studying activity does not make much sense, or it does not make sense at all, although in this case the student can reproduce the learned data and receive credits and high marks for theoretical knowledge. Practical tasks that require spending free time, forces, that are long in time, are usually performed by such students for the sake of evaluation (pass). In this case, there is a discrepancy between the motives determined by the self-assessment method and the actual activity orientation.

Students should be given higher-level tasks that are more difficult than those defined by the educational level, which, with the accumulated amount of knowledge and skills developed, does not advance the student to a higher level of development of their personality.

In this paper, researchers explored the role in the educational and production direction, which belongs to a high and medium level of motivation; average and below average – in the scientific and research direction. Numerical indices of motivation in the research and production direction of activity are lower than in

the control (educational) and all other areas of activity. According to the focus on the result of the activity, the scientific and production area (0.7) is on the first place, followed by the scientific and research (0.51), educational (0.35). Perhaps the direction of motivation for the result of activity in the educational and production direction is due to the uncertainty in achieving high practical results. As the motives determining cognitive-practical activity during field practice, we identified 15 types of activities, which we reduced to 4 groups, which determine 4 levels of motivation.

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Table 1. Motives that determine cognitive and practical activity during field practice

Activity direction	Activity motives
1. Perfection of labor	1. Recognition by the society, authority; 2. Possibility to improve professional knowledge, creativity, innovation; 3. Possibility to develop abilities; 4. Possibility of satisfaction of interest.
2. Effectiveness	1. The public importance; 2. Development of inclinations and abilities; 3. Self-sufficiency; 4. Possibility of satisfaction of interest; 5. Material remuneration.
3. Directivity to emotional communication	1. Ability to work in a team; 2. Variety in the types of labor operations; 3. Possibility of satisfaction of interest.
4. Procedural orientation	1. Absence of physical activity; 2. The presence of free time; 3. Harmless working conditions.

Table 2. Dynamics of the orientation of cognitive and practical activity in the process of preparation and conduct of field practice

Group No.	Stages of activity					
	Problem selection	Object selection	The dominant motive of activity	Selection of creative groups	Total	Final result after EFP
1.	P/E	P/E	C	E/C	E/P	E
2.	P	E/P	E	C	P	E
3.	P	E	E	C	E/P	P
4.	P/E	P/E	E	C/I	E	P
5.	E	E	E	C/I	E	E
6.	E	P/I	E/I	C	E	I/E
7.	E	E	E/I	C	E	E
8.	I	P	E/I	C	E	E
9.	I	E	I	C/I	I	I
10.	E/P	E/P	E	C	E	P
11.	P	P	P	I/P	P	P