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The technology of training of the future teachers of biology to formation of pupils' scientific notions

Summary

This article is devoted to the problem of training of the future teachers of biology to formation of pupils' scientific notions. The system of didactico-methodical skills to manage the process of formation of pupils' scientific notions. has been defined. The peculiarities of formation of these skills in the methodical training of future teachers of biology have been investigated.

It has been proved by pedagogical science, that psychological, pedagogical and special knowledge is necessary, but insufficient condition of professional competence of teacher. The practical solvation of pedagogical tasks is provided by teacher's abilities and skills (Mojseuk, 2003, 148).

Biology as a school subject is the system of the interrelated notions which develop in a logical sequence. That is why the important constituent of cognitive-operating component of readiness of future teachers of biology to professional activity is, to our opinion, formed skills to manage the process of formation of pupils' scientific notions. The recognized condition of training of the future biology teachers to formation of pupils' scientific notions is systematic and successive work with the system of the schools courses scientific notions during the study of the special (biological) disciplines and establishing of intersubject connections between the special (biological) disciplines and methods of their teaching. According to our supervisions the fundamental notions are being formed during the study of the biological disciplines. The tasks on determing of notions, revealing of their substantial features and their processing are episodically included in lectures, practical lessons and seminars. However it does not provide the proper level of readiness of students to formation of pupils' scientific notions. The personal necessity, steady interest to organization of pupils' work with biological notions and

the system of skills to organization and guidance of pupils' activity during mastering of scientific notions are formed exactly in the process of methodical training of a future teacher. That is why it is important to elaborate technology of training of the future biology teachers to formation of pupils' scientific notions.

The insufficient study of problem of training of future teachers to formation of scientific notions and absence of the system of training in universities (theoretical and practical) are specified in researches of A. Usovoy, N. Kuznetsovoy, R. Abbasovoy, S. Korshakovoy, D. Bogdanovoy. Numerous pedagogical researches mark the low level of readiness of teachers to realization of this type of activity. It is common knowlege that the gaps in methodical training of teachers are one of the reasons of low level of pupils' mastering of school subject "Biology" and, in particular, theoretical notions and generalizations of world outlook.

The above mentioned allows to draw conclusion as to the actuality of research of future teachers of biology training on the guidance of pupils' cognitive activity during scientific notions formation.

Considering this type of activity as primary and necessary for the strong mastering of bases of biological science, in our work we made an attempt to define the peculiarities of formation of skills to manage the process of formation of pupils' scientific notions during methodical training of future teachers of biology.

Theoretical basis of research is the thesis of interrelated activity of teacher and pupils as a basic mechanism of formation and functioning of biology notions in studing. The major condition of the successful mastering of notions is organization of process of studing, at which formation of notions takes place in an active practical form in the process of solvation of educational tasks (Russian pedagogical encyclopaedia, 1999, 174). A teacher is a person who has necessary professional training and is always ready to organize pupils' activity of mastering of scientific notions.

As a result of complex study of problem we have defined the system of didactico-methodical skills to manage the process of pupils' biology notions formation:

- to determine the initial level of formtion of notional base of pupils;
- to plan the pupils work with notions taking into account the peculiarities of different groups of biology notions;
- to forecast difficulties of process of scientific notions formation;
- to analyse educational content, directed on notions formation;
- to select "key" notions, set connections and relations between them within the limits of the separate systems of notions and system of school subject "Biology" notions;

- to carry out the symbol-graphic representation of maintenance and structure of notions;
- to design various variants of studing the educational material depending on pupils' psychological peculiarities and logic of his exposition in educational literature;
- to gather additionally rational methods and adopting formation of notions;
- to develop the systems of cognitive tasks (from genesial to creative), directed on formation of pupils' scientific notions;
- to organize and manage pupils' doing of cognitive tasks, to stimulate pupils' activity;
- to carry out current and final control of quality of pupils' mastering of scientific notions, objectively to estimate the results of their activity;
- to develop criteria and determine the level of pupils' mastering of notions;
- to analyse the job performances from organization of pupils' cognitive activity during formation of scientific notions.

We consider that these skills provide stage-by-stage technology of formation of pupils' scientific notions of school subject "Biology".

The technology of the stages of work:

I. Training of pupils to study and to formation of skills of working with notions; actualization for pupils of options is directly before the beginning of studies.

Formation of skills to study (pupils get knowledge about the purpose of future activity of mastering of biology notions, setting (motivation) on the necessity of formation of notions is created). A teacher works off knowledge and skills with pupils, providing possibility of their application in the future.

II. Preparation of facilities of study: textbooks, manuals, methodical materials, technical aids studies; drafting and presentation of chart of reference basis of in-specific actions.

III. The guidance by cognitive activity of mastering of biology notions: by reference, executive and supervisory parts. The degree of guidance can change during formation of notions for pupils of secondary and high school, as weel as notions of different degree of complication.

IV. Correction of results of own activity, correlation of the attained results of mastering of pupils' notions with a weekend by having a special purpose tasks.

Formation of the selected skills is carried out in the process of methodical training of future teachers of biology. The forms of this training are defined

by modern approaches to organization of process of studing at high school. Integration of the Ukrainian system of education in European educational space foresees the change of dominant forms of organization of educational students' activity from a lecture-seminar on independent work and orientation of all types of educational activity from lecture-informing on individually-differentiated, personality-oriented.

The substantive provisions of theory of scientific notions formation are examined in the lecture course of methods of biology teaching. As only on the basis of complex study of theoretical principles training of future teachers is carried out to formation of biology notions for pupils. Attention of the future teachers is accented on such questions as: psychologico-pedagogical bases of formation of scientific notions; typology of notions "Biology"; substantive provisions of theory of notions; terms of biology notions formation.

The future teachers must in detail learn psychologico-pedagogical terms which are instrumental in pupils' mastering of scientific notions (Usova, 1986, 105). We are convinced, that purchased theoretico-practical and methodical knowledge are pre-condition of formation and development of skills to manage the process of formation of pupils' scientific notions by the future teachers of biology.

The basic among them are :

- teacher's knowledge of maintenance of notions which are formed;
- knowledge of requirements as to the mastering of notions, and seeing of formed top level of notions for pupils; teacher's knowledge of the basic stages of notion development;
- the correct choice of method of notions formation, methods and devices, which provide rapid extraction of substantial features, connections and relations of this notion with other;
- motivation of introduction of every new notion;
- organization of active pupils' cognitive activity on all stages of formation and development of notions;
- faithful combination of evidently-vivid, verbally-theoretical and effectively-practical components of pupils' thought;
- organization of the system of independent works of mastering of notions;
- early establishment of connections and relations of notion which is formed, with other notions of this system and other systems of the sybject;
- teacher's knowledge of the pupils' notion base and their vital experience;
- account of the knowledge which was independently acquired by the pupils (from radio- and telecasts, movies, literature, computer programs and textbooks);

– realization of intersubject connections;
– acquiring of pupils by the proper mental operations;
– the usage of generalized plans of mastering of basic classes of notions use.

At practical lessons theoretical provisions are specified on the example of the basic notions of school biology, and systematization of obtained theoretical knowledge and developing of skills to manage the process of formation of pupils' scientific notions are taken place. It enables students to design the teacher activity when preparing to the lessons didactic purpose of which is formation of biology notions.

The practice of teachers training in National M. P. Dragomanov Pedagogical University shows, that it is effective at the beginning of studing of methods of biology training to conduct developed by us thematic practical lesson "Methods of biology notions formation" (Tsurul and co-authors, 2005, 13-15).

The skills to manage the process of formation of pupils' scientific notions are form not only during practical lessons of methods of biology teaching, but during the students's individual and indepedent work. In the structure of the student's educational loading of the ECTS individual work is one of the basic components of educational activity and occupies considerable part of his educational loading. According to modern ideas independent work must be individualized, and the development of its content and its kinds must be carried out taking into account the level of creative possibilities of student, his educational achievements, interests and educational activity. The studing of future teachers with our methodical manual "Formation of pupils' biology notions: psychologico-pedagogical principles and methodical peculiarities" (Tsurul, 2004) strongly corresponds to such requirements. Except this manual we prepared a reader "Reader on the methods of biology teaching. For the students of biology specialities of higher pedagogical educational establishments" (Tsurul, 2007). It was prepared for the methodical providing of practical and individual lessons, processing of individual educational-experimental jobs, training of papers of diplomas and master's degrees of terms in the conditions of the credit-module system of organization of educational process. The special attention is paid to the works of scientists-methodists and creative teachers on explored issue.

Pedagogical practice as a finishing stage of the professionally-pedagogical formation of future teacher acquires an exceptional value in training to manage the process of formation of pupils' scientific notions. Exactly during pedagogical practice students are in a position to build an educational process on the basis of the obtained theoretical knowledge and skills as the results of the conducted design of teacher's of biology activity. By this activity, the readiness of future teachers to independent professional activity at school is checked up.

The analysis (self-examination) of lessons, content of which is orientated on the work with scientific notions, favours formation of analytical and reflexive skills.

Attention should be paid to:

on the stage of preparation to the lesson

1. Basic notions which should be used during a lesson; formulation of requirements as to the mastering of scientific notions on this stage.
2. Determination and preparation of facilities of optimal organization of the work of pupils with notions.
3. Methods of organization of pupils' attention, stimulation of interest to future work with notions at the beginning of lesson.

on the stage of questioning

4. The aim of questioning, instructing of pupils on the work with notions.
5. Logical and successive character of questions, directed on mastering of notions by the pupils and developing of skills to operate with them.
6. Activisation of pupils's cognitive activity by different methods.
7. A degree of mastering the notional base-support of pupils during formation of new notions.
8. Analysis of the result of mastering of basic scientific notions, estimation of results of activity by pupils, use of estimation as the means of stimulation.

on the stage of preparation of pupils to the study of new material

9. Generalization of answers of pupils, connection of before studied material with new one.
10. Announcement of possible methods of doing the tasks on mastering of notions.

on the stage of study of new material

11. A place of studing of new material and basic notions in the system of lessons.
12. Selection of educational content, directed on formation of scientific notions, correlation between the volume of the material and educational content of the textbook.
13. Accordance of interpretation of scientific notions to the level of development of science.
14. Accordance of selected methods of formation of scientific notions to the age peculiarities of pupils.

15. Organization of the system of cognitive tasks, directed on mastering of notions and developing of skills to operate by them pupils.
16. Organization of pupils' independent work with notions with the help of the textbook, additional and reference book literature.
17. Conclusion and generalization of lesson, scientific correctness and clearness of formulations of notions definitions.

on the stage of fixing of learned material

18. Methods of fixing of basic notions.
19. Quality and level of formation of leading notions of the theme.
20. Additional explanation of difficult definitions.

on the stage of giving the home task

21. The contents of home task, its orientation on mastering and processing of the notions.

co-operating with the pupils

22. Knowledge of pupils's cognitive possibilities and capabilities, individual approach of notions formation.
23. Creation of the atmosphere of the personal interest and comfort during tasks on mastering and processing of the notions.

result of the lesson, its estimation

24. An educational value of the mastered notions.
25. Educational achievements of pupils as a result of acquiring and processing of the notions.

The training of future teachers of biology to systematic and purposeful guidance of the process of formation of pupils' scientific notions engulfs also such forms as field methodical practice and optional courses. However possibilities of the noted forms of methodical training of future teachers of biology are not fully used.

Summing up we would like to underline that perspective direction of improvement of professional training of future teachers is an orientation of the content of individual work of the methods of biology studies to training of formation of pupils' scientific notions. Formation of the high-quality of new level of readiness of the investigated type of activity will be provided also by the optional course "Methods of formation of biology notions", development and introduction of which in higher pedagogical educational establishments is the requirement of time.

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Tehnologija treniranja budućih učitelja biologije za oblikovanje znanstvenog mišljenja učenika

Sažetak

Članak je posvećen problemu treniranja budućih učitelja biologije za oblikovanje znanstvenog mišljenja učenika. Definira se sustav didaktičko–metodičkih vještina potrebnih za usmjeravanje procesa oblikovanja znanstvenog mišljenja učenika. Istražuje se posebnost oblikovanja navedenih vještina u metodičkom treningu budućih učitelja biologije.