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Beekeeping in the context of professional activities of future technology teachers in Ukraine

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***Abstract**. The literacy of future teachers of technologies for the production of honey by bees for all will be from the entire organization of their profile training of high school students. It is substantiated that it is realistic to choose educational material about beekeeping in the context of technological competence of future teachers of technologies. Based on the educational material relevant to the essence of the professional activities of future teachers of technologies, it is possible to develop a number of educational projects.*
***Keywords**: technology teachers, specialized training, honey production by bees.*

Beekeeping is one of the unique branches of agriculture, which people treat all over the world as a hobby, part-time job and business [4]. This means that this branch arouses natural interest among the general public. These facts create unique prerequisites, in our opinion, for teachers to pay attention to the content of knowledge in beekeeping.

In Ukraine, the functional responsibilities of a technology teacher include organizing specialized training for high school students with the aim of their future professional self-determination. However, beekeeping is not only a branch of agricultural production, but also a branch of science. It is clear that the natural interest of high school students is not enough to comprehend the depths of this science. Here, on the one hand, it is necessary to take into account the age capabilities of high school students, and on the other hand, the nature of the professional competence of future technology teachers.

The nature of the professional competence of future technology teachers must be considered from the fact that it is based on subject-specific technological competencies. In any technology, there is a subject of labor and means of labor, which are interconnected by certain technological processes (a sequence of technological operations). Therefore, technological competencies are closely related to the understanding by schoolchildren of the organization of technological processes for the transformation of raw materials, blanks, semi-finished products into finished products.

From the standpoint of the technological competence of future teachers of technologies in beekeeping, it is necessary to distinguish the subject of labor and means of labor. At the same time, it is necessary to take into account that the final product of beekeeping can be not only honey, but also royal jelly, perga, wax, etc. Accordingly, initially they are determined with the products of beekeeping. It is clear that the main product of beekeeping is honey, therefore, in the profile education of high school students, it is advisable, in our opinion, to limit ourselves to the technology of honey production.

From the standpoint of the professional competence of future teachers of technologies, they consider not the biology of the bee colony, but the subject of labor, means of labor and technological operations and technological techniques. The subject of the work will be flower nectar as an aqueous solution of sucrose. The means of labor here are of two types, in particular, biological (the bee organism) and technical (the beehive). The technology of honey production by bees is by its nature chemical-physical processes, that is, the essence of technological operations and technological techniques is precisely this.

Let us consider the technological chain of honey production by bees. The first technological operation is the selection of nectar from flowers by the bee's proboscis; the second technological operation is associated with the bee transporting nectar to the hive with the simultaneous partial conversion of sucrose into fructose and glucose using bee enzymes; the third technological operation is associated with the transfer of nectar from forager bees to recipient bees; the fourth technological operation is the further conversion of nectar sucrose into fructose and glucose in the body of the recipient bee with the partial removal of water, which is up to 80% in nectar (the following technological techniques are used here: repeated swallowing and regurgitation of nectar by the recipient bee; attaching a drop of nectar to the top of the honeycomb cell so that the water evaporates when the semi-finished product flows to its bottom); the fifth technological operation is the intensive removal of water from the semi-finished product by organized ventilation using the wings of fan bees; the sixth technological operation is the transfer of unripe honey from the lower cells of the honeycombs to the upper ones for final evaporation up to 20% in the finished honey; the seventh technological operation is the sealing of the cells of the honeycombs filled with honey with wax lids.

Thus, a purely technological approach to the organization by teachers of specialized training technologies for high school students in beekeeping allows them to simplify the content of the educational material on beekeeping and form an understanding of how bees make honey. It is clear that this will not be about the competence of schoolchildren in beekeeping, but about literacy in the production of honey by bees for everyone. In our opinion, literacy in honey production by bees for everyone will be the basis for further formation of competence in beekeeping, where the main content of knowledge will be related to the biology of the bee colony, which will allow future beekeepers to consciously manage the life of the bee colony.

Given that the organizational basis of the profile education of high school students is the project approach, let's consider the approximate essence of potential educational projects [1]. In our opinion, the manufacture of a transparent beehive will be the main educational project, during the implementation of which it will be possible to combine theoretical training and craft work, as well as obtain as a result of its implementation a visualization of many technological operations and technological techniques for making honey by bees. In our opinion, a number of educational research projects will be useful, during the work on which schoolchildren will discover a number of technological phenomena, for example, flower nectar, fermentation of nectar, transformation of sucrose into fructose and glucose, physical foundations of removing water from nectar, the structure of a bee hive, engineering solutions of the bee regarding

the construction of honeycombs, scientific foundations of honey ripening, etc. Also, in the course of forming literacy in schoolchildren on honey production by bees, it is realistic to organize a series of lessons on solving educational inventive problems by schoolchildren. It is known that invention is one of the types of technical creativity of schoolchildren [2]. The literature describes methods of invention and inventive heuristic techniques [2; 3]. In particular, in our opinion, the method of analogies, the method of heuristic techniques and the method of narratives will be useful for organizing the solution of inventive problems by schoolchildren on beekeeping.

Inventive tasks should be developed in such areas as: comparison of beekeeping and frame beekeeping; inventions related to the beehive as an attempt by people to facilitate the process of maintaining bee colonies for themselves; progressive invention of the Ukrainian beekeeper P. Prokopovych; fight against the varroa mite and harmful insects aggressive to bees; beehive ventilation system; organization of bee logistics, etc.

It is advisable to briefly dwell on the invention of the Ukrainian beekeeper P. Prokopovych, because it was of fundamental importance for the development of frame beekeeping. Here, it is necessary to reveal to schoolchildren the elements of the biology of a bee colony, that in the honeycombs there is not only honey, but also bee brood (eggs, larvae, pupae of worker bees), perga (flower pollen fermented with honey), royal jelly in special cells of the queen cells, that the queen bee has larger overall dimensions than worker bees. It is necessary to explain to schoolchildren the main disadvantages of honey in beekeeping. After that, set the schoolchildren an educational inventive task to eliminate the disadvantages of honey from beekeeping. Then organize the process of finding a solution to this inventive task using heuristic techniques of separating contradictions in space and the heuristic technique of “local quality” [2]. As a result, students will implement P. Prokopovich’s invention “Separating grid”, which allows for the easy selection of honey without bee brood from a beehive.

Thus, we have substantiated the selection of knowledge about beekeeping relevant to the essence of the professional activities of future technology teachers. Further research should be continued on the justification and development of methodological support for the process of organizing specialized training of high school students about beekeeping by future teachers.

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