ОБРАЗОВАНИЕ ЗА РУБЕЖОМ

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INTEGRATION OF INTRADISCIPLINARY TOPICS AND GEOGRAPHY IN THE TEACHING PROCESS OF TECHNOLOGY

Abstract. *The research* paper deals with complex approach to integrative learning of most relevant themes of the subject of Geography and the subject of Technology. Within the section «Technology of woodworking», which is part of subject of Technology, it is important to teach students the form of coherent information on the processing of wood, properties of selected tree breeds, features of the installation details, types of trees used for timber production, the origin of trees, and expansion of trees over areas. All these knowledge should be delivered to students through an integrative teaching process.

Methods. Study method of this research paper involves two main methods: statistical analysis as quantitative research method and literature review as qualitative research method. Based on statistical analysis the researcher tries to find out detailed information regarding facts that are used in the subject of Technology. Whereas literature review is referred in order to investigate the possibility of integrating the two subjects for the sake of better delivery of necessary knowledge to students. Moreover, as supporting research methods systematic approach to educational issues on the purpose of examining complicated issues precisely.

Results. The study revealed possible emergence of interdisciplinary connections while realising integrative teaching of «Technology of woodworking» together with the teaching of Geography. Moreover, the research paper recommended giving priority to various collaborative learning processes while carrying out integrative teaching. Furthermore, the author provides detailed information about features and types of trees eligible for timber production, and also indicates statistical data about trees which are considered relevant information in the teaching of «Technology of woodworking».

Scientific novelty. The implication and scientific novelty of the article contributes a lot to contemporary educational approaches one of which is integrative teaching or, in another word, inter-curricular integration. Thanks to the integrated teaching of Technology and Geography, it is possible for the students to learn the

subject comprehensively and much better because integration creates conditions for the development of logical thinking and the formation of ability of independent thinking of students. Moreover, integrative teaching of subjects contributes to the build close relationship between the subjects and themes which have a positive impact on the creation of a dialogue and mutual understanding between teachers and students. This fact, in its turn, lays the foundation for an integrative approach to the study of the subjects.

Practical significance. The results and suggestion of this research paper are considered appropriate to be used when creating integrative learning of Technology and Geography in vocational schools and when studying interdisciplinary issues for vocational schools.

Keywords: learning process, inter-curricular integration, Technology, Geography, in-depth study, wood.

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ИНТЕГРАЦИЯ В ПРОЦЕССЕ ПРЕПОДАВАНИЯ ПРЕДМЕТА «ТЕХНОЛОГИЯ» ВНУТРИДИСЦИПЛИНАРНЫХ ТЕМ И ГЕОГРАФИИ

Аннотация. *Цели* статьи – показать возможности включения в содержание предмета «Технология» фрагментов курса географии и продемонстрировать комплексные подходы к изучению отдельных тем.

Методология и методики исследования. В процессе работы использовались статистический анализ как количественной метод исследования и обзор литературы как качественный метод. На основе статистического анализа отбирался фактологический материал, необходимый для освоения технологии деревообработки; обзор литературы позволил выявить оптимальные варианты интеграции дисциплин с целью усиления эффективности процесса усвоения студентами знаний в данной отрасли. Кроме того, как поддерживающий метод применялся системный подход к решению проблем образования в целом и к детальному рассмотрению сложных аспектов деревообрабатывающего производства в частности.

Результаты. На конкретном материале раздела «Технология обработки дерева» рассмотрены методические подходы к преподаванию технологичес-

ких курсов в профессиональных образовательных учреждениях. При освоении данного раздела важно донести до студентов в компактной, но содержательно исчерпывающей форме как разноплановую информацию прикладного характера (о способах сушки древесины, особенностях оформления чертежей ее обработки и проч.); так и сведения об используемых для получения древесины видах деревьев, об их происхождении – ареале произрастания, о природных и механических свойствах древесных пород и т. п. Успешно справиться с указанной методической задачей помогает установление внутридисциплинарных связей между отдельными темами и разделами технологического курса и междисциплинарных связей с учебным курсом географии. Интегративный подход к обучению экономит силы и время учащихся и преподавателей и одновременно способствует значительному улучшению результатов профессиональной подготовки.

Научная новизна. Установлено, что благодаря интегрированному преподаванию достигается всестороннее и качественное изучение предмета, создаются условия для развития логического мышления и формирования способностей самостоятельного мышления учащихся. Интеграция дисциплин в учебном процессе, кроме прочего, оказывает положительное влияние на взаимодействие педагога и учащихся, основанное на сотрудничестве и диалоге между ними.

Практическая значимость. Даны рекомендации по использованию в средних специальных учебных заведениях предлагаемых автором методов комплексного преподавания технологических курсов и интеграции их с другими предметами для более глубокого изучения внутридисциплинарных вопросов. Показана целесообразность групповых методов обучения.

Ключевые слова: процесс обучения, межпредметная интеграция, технологии, география, углубленное изучение, дерево.

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The aim of the reforms conducted in the system of vocational education in Azerbaijan is to improve the quality and content of education, develop professional training, introduce new learning technologies and create inter-curricular integration. An interdisciplinary integrative training (inter-curricular integration) has a positive effect on in-depth study of the subject. Integrative learning is a learning process in which an integrative approach in the study influences the development of students' logical thinking. Inter-curricular integrative teaching also helps the teachers and learners to save time and resources. Saving time and resource contributes to a more in-depth understanding of the subjects, also increases the quality of mastering the subjects [12, p.

150]. That is exactly why an integrative study of the Geography and Technology has attracted lots of attention of educators.

One of the areas of Technology is «Technology of woodworking and metalworking». In the process of teaching «Technology of woodworking and metalworking», the students are provided with knowledge about wood treatment technology of selected wood, its structure, form, origin, specific features of it manufactured parts and installation work. The teacher, who delivers the above-mentioned knowledge, should be well informed and trained about the type, composition, quality and stability of the trees. For this purpose, the geographical study of trees and forest materials required for timber production and also the integration of some of the topics in the subject of Geography will contribute to an in-depth study of the wood processing technology. Students should definitely have necessary information and understanding about the mechanical and physical properties of wood [8].

The physical properties of the timber include its density, moisture, colour, odour, stability and resistance against the influence of external forces and impact. Depending on the type of form, timber can be light but strong. It is considered appropriate that the topics about the properties of wood should be taught on an integrative base, and moreover the students should be provided with profound knowledge about forests and timber industry in the Geography course.

Forests are considered to be the most valuable national wealth of Azerbaijan. From a biological point of view, development of forest is related with the growth of microorganisms [13]. In 18–19th centuries, 35% of the territory of present Azerbaijan was covered with forests. Currently, the total area of forests is 1021 hectare, representing 11,8% of the current territory of the republic.

Azerbaijani forests have a unique forest formation. There are different forms of pine hamate, pinyon-juniper woodland, oriental beech, oak trees (normal, chestnut, the Caucasus, Eastern and long stalk), and Araz oak. Other species of oak (golden, brown, grey, and others) do not make up special forms, but rather are involved in the other types of oaks. In addition, there are forest oak types which include hornbeam, ironwood, birch, velvety poplar, poplar Tranttovera, persimmon, elm, ordinary walnut and chestnut, silk acacia, false hazel, alder, poplar woods and riparian forest along the banks of the Kura and Araks.

There are over 4500 species of higher plants belonging to 125 families and 930 genera in Azerbaijan. 450 of these species of trees and shrubs, which belong to 48 families and 135 genera, are native to the local forests.

There are 70 regional endemic species in the flora of Azerbaijan. This represents 16% of the total composition of trees and shrubs [15].

Forests of Azerbaijan consist mainly of broadleaved species. Coniferous forests presented pine hamate (Pinus Hamata), common in the Lesser Caucasus, lake Goy-Gol, Tavuz, around the village of Boyuk Shamlig and Gishlag, as well as in Gusar region in the Greater Caucasus. The most common type of coniferous forests is juniper forests [17, p. 36].

The distribution of forests over the country according to their age also varies. Age difference of the forests covering the country is as following: young forests in the country – 11,2%, the average age of the forests – 63,3%, growing up forests – 13.4%, mature and old forest – 12,1%.

There are 150 species of wild fruits in the forests of Azerbaijan which belong to 1,536 genera. This situation creates a better condition for the development of beekeeping. Currently, forests contain about 7,000 bee colonies.

As mentioned above, the forests of Azerbaijan consist of different species, composition and growth environment. Despite this diversity of the flora, the main forest-forming species in the forests are very few. They grow in the forests of Azerbaijan. There are mainly two types of broadleaved and coniferous species in Azerbaijanian forests. Coniferous forest consisting of Eldar pine tree occupies 400 hectares. Moreover, there exist mixed deciduous forests consisting mainly of Eldar pine (Pinus Eldarica), yew (Taxus Bacaata) and small forest. Such small coniferous forests are found in the Greater Caucasus in burial area Gamzaly in Pirgulu, Khizi and Oguz district, in the woods, called Dahardibi; the Lesser Caucasus – in the Goy-Gol in Gadabay forests; in Talysh Mountains, in the village of Lerik region around Hamazat.

The most common type is coniferous juniper. In the Azerbaijani forests there can be found Gazakh juniper (Juniperus Salina), oblong juniper (C. Oblonqa), dwarf juniper (C. Puqmaca), stunted juniper (C. Depressa), red juniper (C. Polucarpos) and others species. Large tracts of juniper located in Bozdag, in Nakhichevan forests. There are also woodlands of juniper [5, 13, 15]. Massive part of juniper is located in Bozdag, in Nakhichevan forests. There also exist woodlands of juniper [5, 13, 15].

Coniferous forests, pine and juniper presented constitute 1.6% of the total forest cover. In Azerbaijan, there are no evergreen broad-leaved forests. These tree species can only be found in plantations such big cities as Baku, Sumgait, Ganja, Sheki. The forests of Azerbaijan mainly consist of broadleaf species which shed their leaves.

The distribution of the dominant tree species making up forests in Azerbaijan is as following: pine – 0,04%, juniper – 2,37%, beech – 31,7%, oak – 23,4%, hornbeam – 26,01%, ash – 0,01%, birch – 0,22%, poplar –

3,58%, alder – 1,87%, linden – 1,71%, elm – 1,16%, the remaining species – 7,05%. Despite the different composition of the forests, broad-leaved trees such as beech, oak and hornbeam are dominant species. 85,5% of the forests are occupied mainly those three kinds of trees. The main part of the forests (85%) is the highland forests which improve the climate, soil protection and operating water treatment.

Forests also differ in density. 13,7% of the forests of the country is composed of forests of low density (0,3 – 0,4), 2,62% – average density (0,5 – 0,6), 18,3% of normal density (0,7 – 0,8), and 2,62% higher density (0,9 – 1,0). The total average density of forests is equal to 0,56%.

Forests are also classified according to their yield. Forest High I – II bonitet make up 14,9%, III site class – 42,3%, IV site class – 27,4%, and a low, V bonitet 15.4% of the total forest cover. The average annual growth of the forests is 1,74 cubic meters. m. The increase in hardwood (beech, oak, hornbeam) is 1,77 cubic meters, and increase in softwood (poplar, false nut, ash) is 2,15 cubic meters [5].

Distribution of forest heights in the country also has its characteristic features. On the northern slopes of the mountains grow mainly oak and ash. Forests located on the lower mountainous areas are composed of elm and ironwood; but middle and upper mountainous areas of mostly full of productive oak and ash tree. In the area of transition from forest to subalpine zone there are unproductive forests of birch and beech. This pattern, however, has its own characteristics in the Lesser and the Greater Caucasus, and Talysh Mountains.

If we fail to prevent illegal deforestation, the republic will face serious environmental disasters such as the expansion of erosion processes, increase of sandy areas, landslides, floods and avalanches in mountainous areas, danger of dry springs and rivers etc. Therefore, we need to pay more attention to the following key areas in the field of forestry issues.

It is especially necessary to increase the volume of reforestation and forest planting sparsely forested and non-forested lowland areas of Azerbaijan. Furthermore, it is necessary to carry out a large-scale restoration and reconstruction of riparian floodplain forests located in the valley of the Kura and Araz rivers which are the main waterway of the country.

In order to prevent water erosion in mountainous areas it is needed to lay protective forests on large areas. Also it is critical to take urgent series complex measures in the basins of mountain rivers for the purpose of their recovery (reforestation, agroforestry, Hydroland etc.). It is necessary to develop and implement special projects and specific action plans for greening littoral sand pits.

Suffice it to say that, according to annual report, 1,2–1,5 million cubic meters of timber and 200–250 thousand tons of coal have been imported from Russia to Azerbaijan. This is also, in its turn, have a negative impact on the forests, increasing the felling of forests. There is an urgent need to take low density lowland forests into special consideration since it is almost impossible to conduct of large scale deforestation. Cutting the mountain forests, located mostly on mountain slopes, can possibly lead to the erosion of these areas. On the purpose of establishing forest strips of land reclamation with the valuable trees species, it is therefore advisable to carry out cleaning of saline soils again and over again, depending on soil and climatic conditions [11].

Future teacher of Technology, studying the course «Technology of woodworking» and receiving extensive information about the forests in the Geography course, will need necessary skills to analyze and use the extra information in order to study the topics more profoundly along with learning to think freely and creatively [20, p. 195].

While teaching «Technology of woodworking» integratively it is recommended that the teacher should use various collaborative working methods such as pair work, small groups, the cluster approach, whole class discussion etc. [22]. In the application of integrative teaching of the subject «Technology of woodworking» it is recommended to use such forms of group works in large and small groups, discuss topics, the cluster approach, teaching methods etc. In addition to these forms of group works it is also important hold workshops in schools to involve students in practical training [16].

When studying similar topics through the integration of Technology and Geography a number of problems appear to be resolved. The followings are recommended for the resolution of these problems [9]:

1. It is recommended to realise natural proccess such as drying and treating wood as much as possible while teaching «Technology of woodworking».

2.It is very important to choose the most relevant topics, which will give the best results in teaching and learning process, while applying interdisciplinary integrative teaching of «Technology of woodworking» and Geography.

3. While teaching the integrative learning topics related to the characteristics of the wood and its processing technology, it is also advisable to study the technical and electrical parameters of the equipment used in the study process.

Learning through an integrated studies approach is enhanced when students are actively engaged in meaningful and relative topics. Learners construct and produce knowledge by solving problems, conducting inquiry, engaging in reflection and building a repertoire of effective strategies. Integra-

ted studies help students to become lifelong learners and allow efficient coverage and delivery of curriculum in terms of expertise, resources and time. An integrated approach allows learners to explore, gather, process, refine and present information about topics they want to investigate without the constraints imposed by traditional subject barriers". An integrated approach allows students to engage in purposeful, relevant learning. Integrated learning encourages students to see the interconnectedness and interrelationships between the curriculum areas. Rather than focusing on learning in isolated curriculum areas, an integrated program is based on skill development around a particular theme that is relevant to the children in the class [23]. Therefore integrative teaching of Geography and Technology should be high priority of educators in vocational schools.

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