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Teaching commitment issues of unity of protected life and sustainable development

Abstract: The study aims to develop practical skills among learners in sustainable development and environmental protection, focusing on the North-Western region of Azerbaijan. Through interdisciplinary integration and modern teaching methods, students investigate the potential of renewable energy sources such as solar, wind, biomass, and hydro resources. This hands-on approach highlights the importance of green chemistry and the green economy in addressing the environmental challenges posed by non-renewable energy sources. The research emphasizes the economic efficiency of renewable energy, advocating for its increased use to reduce ecological damage and ensure long-term sustainability. By fostering these skills, the study contributes to developing a workforce capable of addressing global environmental issues effectively.
Keywords: Sustainable development, environmental protection, renewable energy, green chemistry, green economy, interdisciplinary integration, Azerbaijan, economic efficiency, teaching methods.

Összefoglalás: A tanulmány célja, hogy a tanulók gyakorlati készségeit fejlessze a fenntartható fejlődés és a környezetvédelem terén, az Azerbajdzsán északnyugati régiójára összpontosítva. Az interdiszciplináris integráció és a modern oktatási módszerek révén a hallgatók megvizsgálják a megújuló energiaforrásokban rejlő lehetőségeket, például a nap-, szél-, biomassza- és vízenergia-forrásokat. Ez a gyakorlati megközelítés rávilágít a zöld kémia és a zöld gazdaság fontosságára a nem megújuló energiaforrások jelentette környezeti kihívások kezelésében. A kutatás a megújuló energia gazdaságosságát hangsúlyozza, szorgalmazza annak fokozottabb felhasználását az ökológiai károk csökkentése és a hosszú távú fenntarthatóság biztosítása érdekében. E készségek előmozdításával a tanulmány hozzájárul a globális környezeti problémák hatékony kezelésére képes munkaerő fejlesztéséhez.

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[1] Guliyeva Gulzar –Seyidova Antiqa (2020): Teaching chemistry with modern teaching methods. SSU.Scientific news. *Social and humanitarian sciences department.* 3., pp. 94–97.

Kulcsszavak: Fenntartható fejlődés, környezetvédelem, megújuló energia, zöld kémia, zöld gazdaság, interdiszciplináris integráció, Azerbajdzsán, gazdasági hatékonyság, oktatási módszerek.

Introductıon

Educating the young generation capable of 21st century skills starts at school. The formation of competencies, such as soft and hard skills, which they will have in their future activities, starts from the period of education of the learners. Learners of various sciences should not only master the fundamental laws in the learning process, but also develop them from an experimental point of view.

Application of the presented materials from a practical point of view helps to develop various competencies in the students. For example, during the study of any science, no work was done from the point of view of financial literacy related to 21st century competencies, or it was at the minimum level. Unfortunately, later this problem was noticeable in their work. Along with the changes in the education system, the emergence of new learning technologies, as well as learning methods and their application, have already radically changed this approach. Giving the students project-oriented tasks has led to the creation of many skills in them, as well as financial literacy, which has been neglected until now, achieving this skill creates a better employability in the future labor market, as well as an advantage in terms of competition [1]. As we mentioned, this ground is created in the same process, that is, the acquisition of economic knowledge and skills occurs in parallel with the acquisition of scientific knowledge and skills during the teaching of the subject. In other words, students with financial literacy will develop these skills in the future and will not have difficulty working on projects in any enterprise, because they already have practical skills about it, they will be able to determine how important it is to design a project, calculate the costs to be incurred and implement these projects.

Objectıve of the research

The main goal of the work is to interpret the sequence of actions implemented by us so that learners acquire practical skills on protected environment and sustainable development. It is clear that these goals are currently facing all progressive humanity. As we know, since the beginning of the human society, it has used nature blindly, without measure and form, and as a result, today's reality has emerged. The exhaustible sources of energy from natural resources have decreased day by day, and at the same time, a lot of damage has been done to the environment. We are in this business

In order to protect the environment and ensure sustainable development in line with the growing population, we have tried to bring to the agenda the work that learners will do with the facilitation of teachers and the projects that will be prepared as a result. Prospects of using water, air, solar and bioenergy resources related to inexhaustible energy sources existing in the north-western region of Azerbaijan are investigated by the students. As a result of this, the main goal will be achieved: protection of the environment, ecology and reduction of the cost of goods produced due to the obtained ecologically clean cheap electricity. This will also ensure sustainable development.

One of the main goals in this work is to organize the activity from the point of view that the learners have practical skills in green chemistry and green economy, as mentioned above. For this, we consider it important to master the knowledge in the field of photosynthesis through interdisciplinary integration [2].

Research methods

Modern methods of training were used in our research, which plays an important role in achieving results [3]. At the same time, during the training, the principles of training were kept in focus, which plays a specifotoal role in acquiring practical habits [4]. For the full implementation of what we said, this process should be approached in the unity of modern and classical context. Because, by studying the traditional process comparatively, we can adapt the modern education system to the standards of the world education system.

[2] Raziyev, Safar–Guliyeva, Gülzar–Mammadova, Sanubar (2023): From the experience of teaching photosynthesis process with interdisciplinary integration. *PLUS. Scientific Works.* 90., (2.), pp. 62–66.

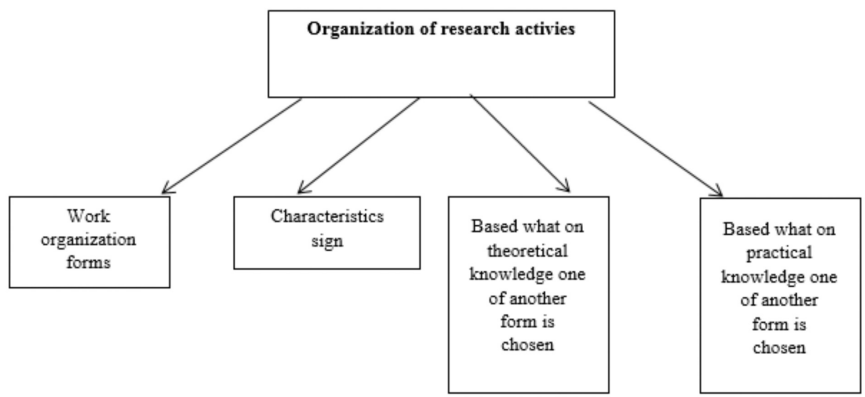
[3] Veysova, Zulfiyya (2008): What should a teacher be able to do to conduct an active lesson effectively? Part I/ facilitation skills/ *Curriculum-scientific-methodical magazine,* 4., pp. 83–101.

[4] Pashayev, Amrulla (2010): Pedagogy. *Science and education publishing house.*

[5] Mukarramoglu, Mehdi (2015): Alternative and renewable energy sources play an important role in solving environmental problems. *People's newspaper.* 10., (11.).

It is also important to follow the principles of didactics in this field (Komensky 1961: 11). The teaching method is based on the independent experiences, researches and hypotheses of the learners. At the same time, it is the determination of the ways of its implementation, the selection of the necessary resources and materials by the learners themselves. These activities can be organized as follows:

Figure 1. Organization of research activies



At the beginning of work with students, we also inform them about environmental factors that ensure the safety of human health. Here, at the same time, achieving economic efficiency as the conclusion of the process is brought to the fore [5]. After that, from the point of view of using alternative energy sources in environmental protection, the production of affordable products will be ensured in the North-West region of the republic.

In this field, a comparison was made between solar, hydro-aero- and bioenergy from renewable energy sources. In the meantime, we note to the students that man, who has a dominant position on earth, has the opportunity to protect himself from anthropogenic influences better than other living beings, because, as the only conscious being, he regulates his activities according to his interests. However, a person's desire to improve his living conditions and livelihood leads to an increase in factors that threaten his health. In our opinion, this process should be approached fundamentally so that our results have a practical effect.

First of all, the roots of the problem, the specificity of our region for today should be taken into account.

First of all, what are the traditional energy sources, as well as their prospects and final promise analysis should be determined here. It would be better to approach the issue from this point of view, taking into account the ability of energy to do work. On the other hand, we must be able to create and accumulate it. But here comes the second main issue: what potential energy sources do we have and how have we used them so far? It is no secret that non-renewable energy sources should be saved. Because these energy sources are blindly used from the beginning and are gradually depleted. So, the way out of the current situation is through the use of more renewable energy sources. On the other hand, as a result of using non-renewable energy sources, the environment is damaged and ecological problems arise. We have air, water, land, etc. here. we can attribute pollution. This ultimately endangers human health. For example, the engine of 1 car burns 4350 kg of oxygen per year, which is more than the amount of oxygen needed to breathe for 10 people per year. At the same time, this engine emits 32 kg of carbon dioxide, 530 kg of carbon monoxide, 93 kg of toxic hydrocarbons and 27 kg of nitrogen oxides into the air during the year. Therefore, to ensure the health of the future generation, we must give priority to the use of renewable energy sources. The other side of the matter is that non-renewable energy sources such as gas, oil, peat, coal and uranium are not economically viable. Accordingly, since the cost of the products produced from the electricity purchased at the expense of these energy sources is high, their prices will be high. We see the way out of this situation in the use of renewable energy sources, which are more efficient in product production. It should be noted that only 0.02% of solar energy, which is one of the sources, is used by plants for photosynthesis. The solar energy used for heating the earth's dry layer, water bodies, and atmosphere returns to outer space after being used in certain natural processes. This circular process that we mentioned has been going on for millions of years. The positive aspect of using solar energy is that it is renewable on the one hand, and it is also used for one purpose on the other. In addition, solar cells are used in spaceships, household appliances, cars, street lighting, etc. is used. However, since the price of these devices is high, their use is not so economically profitable. Sun. One positive aspect of using solar energy is that, as mentioned above, this energy will last for many years, that is, as long as the sun exists. Taking into account the large number of sunny days in our region, the use of this source can be considered economically profitable.

Another renewable energy source for our region is wind, which is always available due to our location. However, the disadvantage of this source is that it requires a large area for the electricity generation facilities.

Biomass is one of the energy sources with the greatest potential in our region. It has too many resources. There are many remains of plants and animals, etc. includes. Since ancient times, the people of this region have used artisanal types of energy sources and are still using them today. Because the application of this energy is very simple. However, the low level of technology in its transportation, storage, and processing increases their cost. As a result, the useful efficiency of biomass heat generators is 0.04%. One of the renewable energy sources that promise great prospects for our region is water.

Therefore, since water resources are abundant, the cost of electricity purchased at its expense is low. For the future, it is possible to build dams in the bed of mountain rivers to install mini-hydro stations and generate low-cost electricity. However, taking into account that fish go to the sources of rivers to spawn, their passage should be taken into account during production.

Addressing what we said to the students, we can conclude that the use of renewable energy sources such as solar, wind, biomass and water in our region promises great prospects for future energy security. Thus, the cost of the products produced due to this energy will be lower, which will lead to an increase in economic efficiency.

Solving environmental problems promises its own effects in various areas of the economy. It should be noted that complex learning with skills in terms of applying ways to solve problems from an early age is of great importance in the development of young people who have been formed in the future as a staff. Because when a specialist suddenly starts working in a team without acquiring these skills, he will not be incompetent, but will act as a competent staff who has learned to cope with this work from an early age. Therefore, it is important to acquire such skills and habits in the training process.

In our opinion, the economic efficiency in the field of energy shows itself more prominently. So, as mentioned above, depletion of raw materials of non-renewable energy sources eventually poses great threats to energy security. Of course, by taking preventive measures, the use of renewable energy sources both prevents environmental pollution and fills the gaps in the energy sector. Regular work in this field is carried out at the state level in our republic. The operation of power plants using wind energy on the Absheron Peninsula in cooperation with companies from Japan, South Korea, and Arab countries can lead to special progress in this field. It is also possible to add hydropower plants to be built on the Araz River and electricity to be obtained based on solar batteries. At the same time, the heat that will be generated at various processing facilities due to biomass is also of great importance in ensuring energy security. The economic effects that will be achieved with the help of the above-mentioned issues will play an important role both in solving environmental problems and in highlighting the problem of energy security in the globalized world [6]. In this area, in our opinion, the main tasks are the protection of the living and non-living world of the environment that surrounds us globally, increasing the stability of the work of all areas of the economy, etc. includes.

[6] Raziyev, Safar (2016): Environmental issues in the context of the globalized world. *Educational problems*. 7., (3.).

Identifying opportunities for a green world and sustainable development

The urgency of environmental problems in the globalized world has already become a reality of the day, and taking into account the importance of this topic, we have conducted research in this field, and this process is being continued in accordance with the requirements of the day [6]. The positive results of these works have a positive impact on environmental protection as well as achieving economic efficiency. In our opinion, in order for the learners to have the above-mentioned characteristics, it is necessary to prioritize integrativeness in the educational process, as evidenced by the studies conducted on having economic progress as a result of interdisciplinary integration [7]. Because with the help of integration, even the weakest of learners acquires knowledge in at least several fields of science. In the article, we have tried to build our activity from the context of what learners can do, not what they know.

Environmental and economic effectiveness of green chemistry and green energy measures

In order to ensure the ecological and economic effectiveness of green chemistry and green energy measures, on the one hand, learners should be taught the importance of nature protection in a globalized world, and on the other hand, they should understand how important their energy security is. In the article, we try to highlight the parallel research of the directions mentioned above. The studies conducted in the fields we have indicated indicate that the economic efficiency will increase due to the environmental protection on the one hand, and the low-cost electricity to be obtained on the other hand [5]. We present this information to students in electronic and visual form. In this process, they are divided into four groups. This division is carried out in fully democratic conditions under the facilitation of the teacher. Brainstorming and carousel are chosen as training methods. In this double choice, the goal is first to get the groups to be united in order to find a solution to the problem together and to make it possible for them to compare the obtained results with each other.

[5] Mukarramoglu, Mehdi (2015): Alternative and renewable energy sources play an important role in solving environmental problems. *People's newspaper.* 10., (11.).

[6] Raziyev, Safar (2016): Environmental issues in the context of the globalized world. *Educational problems.* 7., (3.).

[7] Askerov, Shahlar (2017): Econophysical analysis of the relationship between monopoly and competition. *The Journal of economics sevens theory and practic,* 74., (1.), pp. 4–9.

Because the names of the groups before the topic were appropriately accepted as the names of water, air, light and bioenergy at the research stage.
According to the stages of the active lesson, the groups start working [3].
Consider an example of a task presented to learners during the pre-research phase:

[3] Veysova, Zulfiyya (2008): What should a teacher be able to do to conduct an active lesson effectively? Part I/ facilitation skills/ *Curriculum-scientific-methodical magazine,* 4., pp. 83–101.

Task 1.

Write ”yes” if the statement is true, ”no” if it is false.
1. The process of forming organic substances from inorganic substances in chloroplasts using light energy is called photosynthesis.
2. Photosynthesis occurs only in cells with chloroplasts.
3. Chloroplasts contain the yellow pigment chlorophyll, which gives the plant its color.
4. Plants have devices for capturing light: long and short leaf blades.
5. The plant gets water and minerals from the soil.
6. Photosynthesis comes from the Greek words ”photos” – light, ”synthesis” – connection.
7. Light energy is not needed for the photosynthesis process.
8. Photosynthesis ability is the most important feature of green plants.

A practical work example is as follows:

Carry out the experiment, observe and record the results.

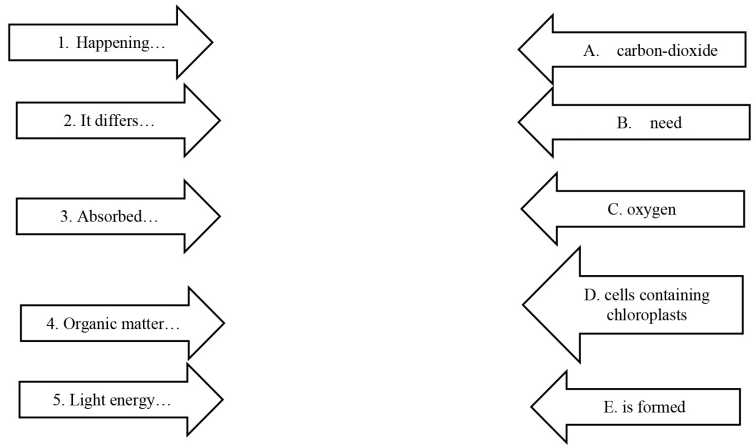
In the last lesson, we take a sheet of black thick paper and cut out the word ”light” on it (Mukhametdinova, 2021: 1). We make an envelope from this paper and put a sheet inside. Place the plant in the sunlight.

The sequence of activities to record the result is as follows:

First, a task is given. A sample assignment is as follows.

Task:

1. Make correct sentences about photosynthesis. Write the corresponding number and letter in your notebook.



Task 2.

”What will happen to the planet Earth if green plants disappear?” write an essay.

Task 3.

Draw a conclusion about the process of photosynthesis using key words and write it in the notebook. Evaluation criteria are mainly activity, cooperation, design, presentation, etc. can be taken.

Research results

In order to achieve the result, the subject material is given to the learners in electronic and mechanical form as information in the form of task sheets. Web tools are also used in the evaluation, which ensures efficiency and transparency. Because being able to use ICT resources forms and develops hard skills in learners. As it is known, the work performed in the conditions of joint activity and cooperation becomes complete, and the qualities created in the learners in this process make it possible for them to have both soft skills and hard skills in the future, and at the same time, they fix their superior abilities as personnel accordingly.

[8] Mukhametdinova, Aygul (2021): *Laboratory work using the technology of critical thinking "Photosynthesis" 6th class,* 28., (11.).

The performance of the groups is evaluated, and the groups have the opportunity to evaluate both themselves and the performance of other groups.

When organizing the form of work with pairs, we can choose the one related to the characteristics of the activity: strong student-weak student or both are equal in terms of success. Based on theoretical knowledge:

1. During the updating of acquired knowledge when the work ahead requires serious thinking initially. Pairs of students discuss the upcoming task.
2. In the course of laboratory and practical works, mutual control and mutual assistance can be organized. In the end, it is possible to evaluate the work done as a result of joint activity.

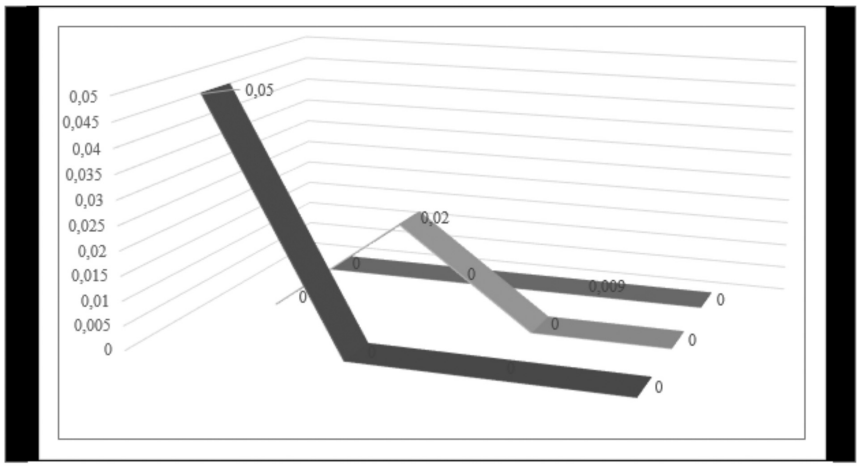
Examples of practical knowledge include:

1. Looking at the introduction guide, learners discuss the task among themselves when they need serious thinking about the practical work.
2. In the course of practical work, mutual control and mutual assistance can be organized.
3. Regarding the final instruction, it is possible to organize the evaluation of the work.

Organic substances produced during photosynthesis include carbohydrates (mainly sugar and starch), amino acids from which proteins are made, and fatty acids. For the synthesis of all these compounds, water (H_2O) and carbon dioxide (CO_2) from inorganic substances , nitrogen and sulfur are additionally needed for amino acids [8]. In addition, phosphorus and metal ions – iron and magnesium – can be included in the composition of organic compounds during photosynthesis.After the generalization process is carried out, the results of the groups are announced. It turns out that after calculating the results by groups in the evaluation phase, group III took the first place, group II took the second place, and group I took the corresponding third place.

According to the results of the experiment, the distribution of the values obtained by the groups according to the relative error is shown in the figure:

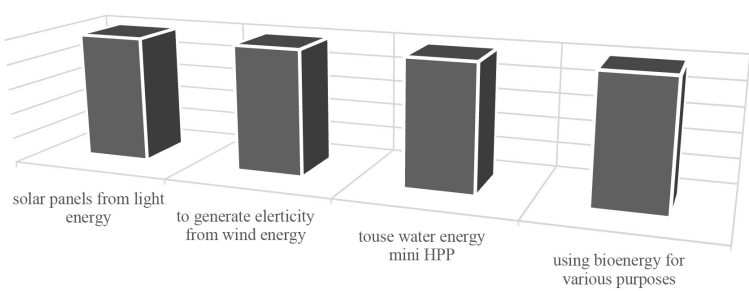
Figure 2. Diaqram of the according to the results of the experiment



Conclusıon

As a result of research, our research on green economy and green development in the North-West region of the Republic helps to reach the following conclusions. We offer recommendations for solving these issues that we mentioned in the North-West region of the republic:

Figure 3. Diaqram of the research on green economy and green development in the North-West region of the Republic



In the future, it is considered appropriate to use the methods mentioned above to help learners acquire practical skills in other areas. Implementation of learning with the help of various modern teaching methods facilitates acquisition and ensures consistent acquisition of knowledge as well as acquisition of skills and habits. In particular, the teaching of ecological and economic knowledge with the extracurricular integration of natural sciences, both theoretically and experimentally, ensures the acquisition of various competencies as well as the comprehensive assimilation of the material.