Integration of skills as one of the basic characteristics of STEM Technology.

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7M01702 "Foreign Languages: Two Foreign Languages"

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Language is being a part of culture, a component of different people’s history has always been a means of communication and has also been undergoing a lot of changes related to the development of the communities.

Kazakhstan is a multinational country and different nations speak different languages and of course our government pays great attention to the development of languages. The Law of Languages established in 1997 says that all the languages that are spoken by people of multinational Kazakhstan are of great importance but three languages such as Kazakh, Russian and English have become prior in state language policy of our independent country. The state language is the Kazakh language; the Russian language is the language of communication and the English language as a foreign language that has become global language for different peoples all over the world.

The language policy in Kazakhstan is the integration of our country into the global community and such significant spheres as economy, culture and science will develop and promote our country to grow and become competitive on the world stage.

STEM is one of the most contemporary technologies of teaching integrated skills, communicative skills and the content knowledge which is both learning the material in a particular subject such as Biology or Physics for example and at the same time learning the English language. A great attention has been paid to the use of authentic materials at the lessons of Biology, Physics, Maths and other subjects which are taught in English. Why are authentic materials considered to be the most effective means of teaching both foreign languages and a certain subject such as Phisics or Biology? Authentic materials are functional and have communicative integrity due to which they meet learners’ needs and activate their thinking activity.

In modern conditions it is important for teachers to take into account the following didactic principles such as:

Systematic involving of students into autonomy activity of applying their acquired knowledge in different sciences and real situations

* Ability to use and integrate their knowledge using cross-curricular links as integral and complex
* Transition from reproductive activity to productive one.
* Teaching students to solve complex problems, which is supposed being able to transfer knowledge and skills from different subjects such as : Physics, Chemistry, Biology, Economics, Maths, Geography and consolidation of complex application of knowledge and skills for solving real problems in our life and labour for improving our quality of life.
* It is necessary to teach our learners to use laboratory equipment correctly and safely, to follow the rules of technical safety, their ability to fix the results of surveys and measurements with the help of different things such as: drawings, tables, graphs, photos, video records, schemes.
* At the lessons of Biology, Physics, Chemistry and Geography, as well as at Information Technology and Maths ,students learn to carry out practical and laboratory assignments, they learn to analyze and compare, generalize and synthesize , they evaluate and make forecasts, make calculations, explain quantity and quality characteristics of different phenomena and processes in nature and organisms. Students are taught to work at different projects, they learn to work in teams or groups while working at projects and each student has a good opportunity to develop his individual natural abilities and creativity, as well as responsibility for the task given for him and autonomy and individual potential.
* Students develop practically - orientated thinking abilities, when at the lessons of Biology, Physics, Chemistry, Maths, Geography and IT when teachers widely use Information- Communication Technologies. And teach learners to work with information in electronic form.
* Computer technologies at the lessons of Biology, Physics and other natural sciences can be the following types:

1. Intensive use of multi-media technologies during the process of learning the course material
2. Intensive use of computers as tools for every day work by teachers and students.
3. Carrying out the technologies of cross- curricular links
4. Project and research work of students
5. Searching and treatment of the information in terms of the target material using Internet
6. Use of electronic tables for solving problems
7. Holding virtual practice and laboratory work.

Taking into account the specifications of studying natural sciences such as Biology, Physics, Geography, Chemistry it has become very important for learners to work at research projects that can be done in three directions:

1. theoretical researches (group researches, individual ones connected with theory research and work with the information and its selection and analysis)
2. Empirical researches ( practical and laboratory work)
3. Individual research projects

Teachers can choose the themes of practical work and laboratory work autonomously, taking into consideration the equipment and other technologies and school facilities. Every student should be assessed for his or her practical or laboratory work.

In this article I want to give some examples of short term lesson plan based on STEM method in Biology.

***Theme of the lesson is: The theory of Evolution***

Lesson aim: In this lesson students learn about the theory of evolution established by Charles Darwin.

1. The lesson starts with warm –up exercise. The teacher writes the words on the board: Darwinism, evolution, natural selection. Then teacher finds out what students know about evolution, Darwinism and natural selection. The teacher explains that learners are going to read the text about the history of Darwinism. Then teacher asks if they can remember any information related to the words.
2. At the second stage the teacher draws learners ‘attention to the photos on the interactive board or

On the projector and in pairs asks them to guess who Charles Darwin was.

Then the teachers offer the learners to read the text quickly and then answer the questions on the text.

When was the theory of evolution established?

Who were Charles Darwin and what was he famous for?

Before reading the text again, the teacher should remind students of the facts the learned in the Warmer, and go through the words in the Glossary box. Then teacher asks them to find them in the text and pre-teach some of the more complex words if necessary.

1. Students read the text again in detail and fill in the missing information in the diagram.
2. Variation: individuals of species cannot be fully identical. For instance, siblings might be of different height and have different eye colours.
3. Inheritance: traits of species are determined by inheritance and passed from generation to generation. In other words, offspring will inherit traits that are passed by genes.
4. Competition: more offspring are born than can survive given the scarcity of natural resources. To illustrate, members of the species compete for limited natural resources available, for instance, food
5. Natural selection: only the individuals who survived in the struggle for existence would be able to breed and pass on inherited traits to the offspring. More officially, the traits that helped parents to survive will be passed on to the next generations.

The next task is to choose the correct alternative: true or false statements.

Then students work in groups and answer the questions about the text and support their answers with examples and solid arguments from the text or real life.

Students can be offered to work in groups at the project:

1 Choose one of the outstanding scientists in evolutionary biology.

2 Find out more about the scholar you have chosen. And what was their contribution. Think about the historical, economic, and political context they lived and worked in. Select information that is insightful and try to collect multimedia files if possible. Consult with your Biology textbooks and seek advice from your teacher if you need.

3 Make a poster about the discovery of your chosen scientist. Describe the steps of completing this project; indicate the sources of information, and photographs if possible. Try to highlight the public’s reaction to the works of your chosen scientist and critically analyze wither the discovery was controversial and why. Present your poster to the class, be open to feedback, and reflect on what you have learned and what you would do differently next time.

This project can be given to students as homework.

Such creative assignments develop autonomy of students, their logical and creative thinking abilities,

Also such kinds of work teach students to work in groups , develop their communicative and language skills, their ability to work creatively and individually and to be responsible and active participants of the research work.

The role of video is very big at the lesson because when students present their projects, learners can see the presentation and they have a good opportunity to memorize the information because visually helps them to understand the material better and deeper and such materials makes the lesson more interesting, memorable and understandable for every student.

V.I. Pisarenko says that the use of video materials at the lesson can be explained in the following way:

1. availability of video materials which can be recorded from different resources
2. a certain experience of how to use video materials
3. more active and creative activity of instructors { 30, p .77-81 }

Elukhina N.V., Komarova YU.E., Mikheeva I.V.,Shabalin YU.V. have researched the use of video-materials and the analysis has shown that video materials enhances the following things:

1. forming students’ steady associations of a certain context with expected speech behavior
2. stimulation of learners’ imagination and creative activity
3. developing all types of learners’ memory
4. creating friendly atmosphere
5. Learners’ motivation
6. Effective learning outcomes

Video materials shouldn’t be too difficult and it should correspond to learners’ level, age, interests and the content should be motivating and carefully selected according to students’ needs and future career.

As we have already said project work develops students’ integrated skills, learners develop speaking, writing, reading skills as well as knowledge in the particular subject on a definite theme in Biology.

Integrated skills can be developed also when we use Information Technology at our lesson, particularly when we provide information through the power point presentation.

Here is the example of the use of ICT at the lesson.

The aim of this lesson is to get students to learn how to design and deliver a Power Point Presentation.

At the first stage we should have warm- up discussion.

The following questions can be offered for discussing.

1 How often do you present information?

2 What programmes do you use?

3 How often do you use the power Point Presentation?

At the second stage we can offer the students to look at the infographics and discuss it in pairs. Then we can elicit answers from the class and discuss why the power Point Presentation is the most popular programme for designing presentations.

The next step is reading the text about making presentations using the Power Point Presentation.

But before reading the text we should work at the new words from the text, that is pre- teach the topic vocabulary. We should write the words in the Glossary on the board and ask the students to find them in the text and explain the meanings of some more complex words, if that is necessary.

Then students read the text and decide if the statements are true or false.

The next step is to focus learners’ attention on the presentation tips and ask them to scan the text to find the correct answers.

Do’s: develop a story and stay focused

Use visuals to present information

Make the presentation accessible

Back up the presentation

Practice

Don’ts: Don’t use too much text on the slides

Don’t use too many effects

Don’t use a font size smaller than 28

Learners can be offered to make a project: Present information using the Power Point Presentation on the target theme, following the plan:

1. Choose a topic that interests you or that is part of your homework. Research prepares information on your theme and structures it. Follow this plan.
2. Create a Power Point presentation to inform your class about the topic. Add some infographics to your slides for data visualization.
3. Deliver the presentation in your class and welcome questions at the end. Evaluate each other using positive feedback.

This example of the lesson plan can be use full not only at the lessons of Biology but at other Lessons such as: Physics, Chemistry, Maths,

Geography and other subjects. Such lessons give learners to understand the course material much better in Biology or Physics, it doesn’t matter what subject it is, and learners improve their knowledge of English at the same time.

Another good example of combining education and technology is learning new material with the help of online course in Biology or other subjects. I want to give an example of a short lesson plan on the theme: Online courses.

At the first stage we can offer the learners a few questions for discussion:

Have you learned online? Have you enjoyed on line learning? Learners can discuss the questions in pairs or in groups and so we can find out what students think about on line courses.

We can offer students reading an article about on-line courses and at first pre-teach new words which are difficult and then students read the text about the on-line course production. After reading the text they answer the questions on the text. Students learn the information about the process of of on-line course creation.

The third step is to complete the chart about the phases of creating the on-line course:

Pre- Production Phase 1: a project plan and course structure is produced.

Pre- Production Phase 2: on-line course lecture scripts are written

Production Phase 3: the on-line course is filmed

Post- Production Phase 4: video and audio are edited

Post – Production Phase 5: the online course is published on a platform

Post- Production Phase 6: a final product is presented passed on to the next generations.

As for the hometask students can be offered to work on the project: Work in group and make a presentation about an online course.

Imagine that you are designing your own on-line course in Biology. Decide what theme you would like to choose, brainstorm the content, structure, teaching methods and key learning outcomes.

Look at the course you have researched in Step 1 and use it to present your course.

In your group, prepare a presentation to launch your on-line course to the rest of the class.

In conclusion I want to say that project work develop learners’ ability to work creatively , to make researches and work collaboratively and solve problems, this project method contribute to learners’ integration of knowledge and skills and combining a particular subject with Technology. Students have a good opportunity to use their knowledge in different subjects and link this knowledge to get new skill or new knowledge. Students’ knowledge of Technology, Biology and English are integrated and orientate students to choose their future career successfully and purposefully.

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