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Cognitive and Emotional Aspects of Integrated STEAM-English Education: Initiatives and Obstacles

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Abstract. Modern education in the twenty-first century is experiencing a fundamental transformation, embracing cross-disciplinary methods to equip learners for an increasingly dynamic global environment. STEAM education, which integrates Science, Technology, Engineering, Arts, and Mathematics, has emerged as a leading educational framework. Our analysis examines how incorporating STEAM methodologies into English language teaching creates comprehensive and enriched learning opportunities.

Аннотация. Современное образование в двадцать первом веке переживает фундаментальную трансформацию, охватывая междисциплинарные методы, чтобы вооружить учащихся для все более динамичной глобальной среды. STEAM-образование, которое объединяет науку, технологию, инженерию, искусство и математику, стало ведущей образовательной структурой. Наш анализ изучает, как включение методологий STEAM в преподавание английского языка создает всеобъемлющие и обогащенные возможности обучения.

Key words: STEAM, training, English, knowledge, language
Ключевые слова: STEAM, обучение, английский язык, знания, язык

The STEAM educational framework cultivates essential 21st-century competencies including analytical thinking, innovative problem-solving, teamwork, and effective communication. When these principles are woven into English language instruction, students develop not only linguistic proficiency but also acquire a diverse skillset crucial for their future success.

Conventional language instruction often occurs in a vacuum, disconnected from practical applications. However, by integrating STEAM elements into English language classrooms, students can practice their language skills in meaningful, real-world scenarios. For instance, students might conduct scientific investigations, compile technical documentation, or engage in artistic endeavors—all while using English as their medium of communication. This approach transforms abstract language concepts into tangible learning experiences.

STEAM's emphasis on practical, experiential learning enhances English language acquisition through immersive activities. When students participate in hands-on projects that require English communication in authentic situations, they develop a deeper understanding of both the language and the subject matter. This integration creates a more dynamic and memorable learning experience, moving beyond traditional textbook-based instruction to engage students in meaningful, context-rich language practice. STEAM projects often involve solving real-world

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problems, encouraging students to think critically and communicate effectively. When integrated with English language learning, these projects offer a platform for students to express themselves linguistically while addressing complex challenges. Through collaborative project-based learning, students develop language skills in a dynamic and interactive environment, preparing them for the communication demands of the future. The arts component of STEAM emphasizes creativity and self-expression. Incorporating artistic elements into English language instruction allows students to explore language in a more imaginative way. Creative writing, drama, and multimedia presentations provide avenues for students to express themselves linguistically, fostering a deeper connection with the language and promoting individuality. STEAM education often involves exploring global challenges and collaborating across borders. English language instruction within a STEAM framework exposes students to diverse perspectives, enhancing their cross-cultural communication skills. Engaging with English in the context of global issues helps students develop a more profound understanding of the language's role as a tool for international communication.

STEM education is not a separate subject, it involves the integration of knowledge from different fields, so STEM education can be used to teach children in different subject areas. Integration of knowledge from different spheres allows future professionals to be successful in most fields. Virtually all experts note that progressive technologies increase motivation for learning and expand basic knowledge in the field of design and programming.

At the same time, STEM-education is traditionally associated with robotics, construction, computer modeling, and other areas associated with engineering rather than humanities and linguistics. However, the potential of STEM-education as a means of developing a child's speech is enormous: collective scientific and technical creativity, in the process of which it is necessary to agree, communicate, formulate new ideas; mandatory defense of creative projects and research works, and so on.

Early learning of foreign languages is a problem that invariably arouses interest and acute controversy in society. On the one hand, there is an objective understanding of the sensitivity of the period of primary school age for foreign language education. On the other hand, the pedagogical community is concerned about the actual issues of organization, methodological support, continuity and continuity of this process. At the same time, the real practice of education reflects the growing interest of parents in receiving educational services for their children's learning foreign languages.

The mastery of foreign languages is regarded as the most important factor of socio-economic, scientific, technical and cultural progress. Teaching foreign languages to children at primary school age contributes to the formation of prerequisites for further learning activities. Foreign languages are studied with a view to their Foreign languages are studied with a view to their subsequent functioning as a tool for comprehensive information exchange, interaction between national cultures and the assimilation of universal values. The country's needs for specialists capable of using foreign languages to ensure various types of communication are increasing. These needs, expressing the essence of the social order to the sphere of language education, determine the content of the pedagogical goal at the socio-economic level.

The main direction in teaching English remains traditional classical methods. However, pedagogical science does not stand still, new methods based on new educational technologies appear.

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STEM technologies as applied to the Physics and Mathematics Lyceum are the implementation of **physics, mathematics and science projects** by pupils. The connection of STEM technologies is that the implementation of projects is carried out in English. The teaching material does not allow for the full use of STEM technologies, but in almost every module there are topics in which it is possible to use project-based research methods. Mostly, of course, these are mini projects.

Some modules contain topics related to ecology. For example, in 8th grade there is a theme "Paper bags vs. plastic bags", "Eco-clothes". These topics have interdisciplinary links between English and ecology and chemistry. Within the framework of the theme "Eco-clothing", pupils make a presentation about different types of fabrics, their peculiarities and in what clothes they are used, also visual material with different pieces of fabrics is made. For example, cotton, bamboo, nylon, wool, denim.

In grade 9 the ecology topic is also presented in the module "In danger" about animals that are on the verge of extinction. The pupils are given the task to prepare a project about the animals living in Uzbekistan and the problems they face. In addition, the pupils make posters with pictures of animals and write a few sentences about the animals, using special vocabulary on the subject.

In grade 9, learners go through the topic about electronic garbage. Students are asked to find material about the placement and disposal of electronic waste in different countries.

The abbreviation STEM (science, technology, engineering, math) in English means synthesis of science, technology, engineering and mathematics. Recently, many also add the letter A (arts) to this abbreviation, which means different types of arts: humanities, foreign languages, new media, painting, dance, theater, music, i.e. the connection with art and design is assumed.

STEAM is one of the trends in global education, which implies a blended learning environment, and shows the child how to apply science and art together in everyday life.

Summarizing the results we can say that the possession of modern pedagogical technologies (STEM-technologies, project-based learning technology, problem-based learning technology, cooperation technology, computer technologies) is a component of teacher's methodological culture. The introduction of new technologies into the educational process changes the position and habitual attitudes not only of the schoolchildren, but also of the teacher.

Skills of the XXI century is a special direction that is being actively discussed at different levels. The essence of the concept is as follows: the key skills that defined literacy in the industrial era were reading, writing and arithmetic. In the twenty-first century, however, the emphasis is shifting towards critical thinking skills, the ability to interact and communicate, and creativity. By incorporating STEAM ideas into English language training, education is transformed into a dynamic, multidisciplinary experience. Educators can educate kids not only to understand English but also to thrive in an interconnected and fast changing world by integrating the power of language with the creativity and problem-solving abilities inherent in STEAM. This comprehensive approach establishes the groundwork for lifelong learning, critical thinking, and innovation.

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