

Methodology of Developing Students Reading Skills Based on Steam Educational Technology

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Abstract: In today's fast-evolving educational landscape, fostering strong reading skills in students is a critical challenge. As literacy forms the foundation for academic success, educators are constantly searching for innovative ways to enhance students' abilities in this essential area. One of the most promising approaches to improve reading skills is the integration of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education. By combining multiple disciplines into a cohesive learning experience, STEAM provides a dynamic and engaging framework that not only stimulates curiosity but also strengthens reading and comprehension abilities.

Keywords: STEAM, reading competence, reading skills, critical thinking, collaborative learning, communication, creativity.



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INTRODUCTION

In today's era of globalization, the development of education worldwide is recognized as one of the most urgent tasks. Education is considered a fundamental factor that determines the spiritual-cultural life and socio-economic progress of every nation. In modern educational paradigms, the individual development opportunities of each student are taken into account, and special attention is paid to forming subject-related competencies in students through new teaching technologies, particularly STEAM education. This approach aims to cultivate qualities such as independent thinking, creativity, innovation, effective communication, and critical thinking. Consequently, this creates a demand for the effective use of STEAM technology in teaching subjects within the school system, which is an integral part of the education sector. In particular, there arises a need to improve the methodological foundations for developing students' speech competence in English classes based on STEAM education.

LITERATURE REVIEW AND RESEARCH METHODOLOGY

This article thoroughly examines the research findings of international scholars, including STEAM education theorist G. Yakman [1], and the perspectives of national scholars such as J. Jalolov [2] regarding foreign language teaching methodologies. Furthermore, studies by researchers such as S. Misirov [3], G. Hamrayeva [4], and A. Ermirzayev [5] on developing students' reading competence in English lessons were carefully analyzed.

ANALYSIS AND RESULTS

Due to the rapid changes occurring in the era of globalization, English has become the most essential language for communication. English is considered one of the necessary subjects for young people who aspire to find a place in society. At the same time, schools, as an integral part of society, are now required to develop not only the intellectual abilities of students but also their “21st-century skills.” These skills include communication, collaboration, critical thinking, and creativity. The STEAM program is one of the several initiatives designed to foster these 21st-century skills [1;3]. There are several differences between STEAM education and traditional education (see Table 1: Key Differences Between Traditional and STEAM Education Programs).

Key Differences Between Traditional and STEAM Education Programs

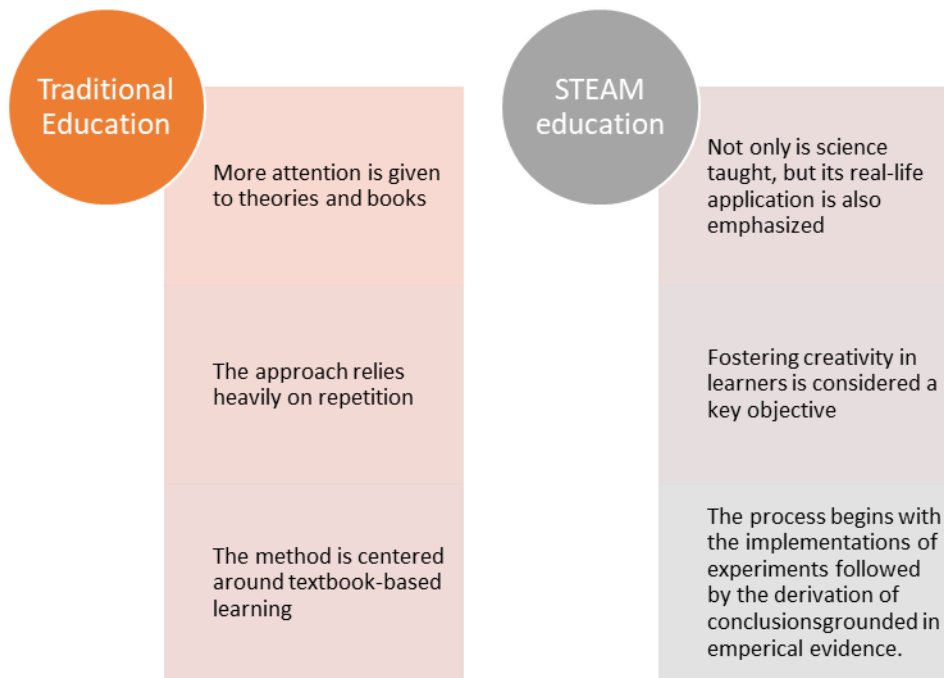


Table 1. Key Differences Between Traditional and STEAM Education Programs

This study mainly aimed to develop the reading competence, specifically the speech competence, of high school students in English lessons through STEAM technologies. “Reading plays an invaluable role in shaping personality—it is a type of speech activity and action that serves as a source of spiritual and educational nourishment. Teaching reading, which is a receptive type of speech activity, serves general educational goals in English” [2;231].

Throughout a person’s life, reading is the main method of acquiring information. Developing reading competence through modern methods based on STEAM education not only helps improve students’ reading literacy but also enhances their critical thinking, problem-solving, creativity, and teamwork abilities.

Reading is not just about decoding words or memorizing vocabulary; it is also about understanding, interpreting, and analyzing content. For students to become proficient readers, they must be able to connect ideas, think critically, and solve problems based on the information they read. STEAM education offers opportunities to engage students with real-world problems that are both challenging and fun, all while incorporating reading activities that promote comprehension and fluency. Here’s how STEAM education can directly enhance students’ reading skills:

1. Contextual Learning and Critical Thinking

STEAM activities are inherently interdisciplinary, meaning students must read, analyze, and understand information from diverse sources, including scientific texts, engineering manuals, historical records, and more. This exposure to different types of writing helps students practice reading in various contexts, which is essential for developing versatile reading skills. For example, a student engaged in a biology experiment will need to read instructions, scientific reports, and relevant literature, enhancing their ability to understand complex texts. Additionally, STEAM fosters critical thinking, as students are often required to read and evaluate multiple viewpoints, solve problems, and synthesize new ideas. The practice of evaluating evidence and making decisions based on reading encourages deeper comprehension and strengthens analytical skills.

2. Hands-On Projects Encourage Reading for Purpose

A core element of STEAM education is the hands-on, project-based learning approach. When students are tasked with designing a robot, creating an art installation, or conducting a science experiment, they need to read instructions, gather information, and make decisions based on the texts they encounter. This active involvement motivates them to read with a purpose, encouraging them to focus on key details and comprehend content more effectively. For instance, a student participating in a robotics project may need to read manuals on coding or mechanics. This technical reading not only improves reading comprehension but also introduces students to specific vocabulary and language structures related to technology and engineering. In turn, these experiences help them become more confident and proficient readers.

3. Storytelling and Narrative Exploration in the Arts

The "A" in STEAM, the Arts, plays a significant role in enhancing reading skills. Creative disciplines such as visual arts, drama, and literature allow students to engage with texts in meaningful ways. Storytelling in particular—whether through books, plays, or multimedia—is a powerful tool for developing reading comprehension and vocabulary. For example, integrating narrative structures from literature into projects like designing a visual representation of a historical event or producing a short film based on a novel can help students understand the importance of plot, character development, and thematic exploration. These activities promote reading fluency while also encouraging students to think creatively and critically about the texts they engage with.

4. Collaboration and Communication through STEAM Learning

STEAM emphasizes collaborative learning, where students work together to solve problems or create projects. Group projects, in particular, offer students the opportunity to practice reading collaboratively, sharing ideas, and discussing what they've learned from texts. Working with peers fosters verbal communication skills and helps students better understand the material they read through discussion and dialogue. For example, when working on a group science experiment, students will read research articles, discuss findings, and collectively decide on the best course of action. This collaborative reading and conversation not only help improve comprehension but also build vocabulary and contextual understanding.

5. Use of Technology to Enhance Reading Engagement

Technology is an integral part of the STEAM framework, and its use in reading instruction has proven to be effective. Digital platforms such as interactive e-books, educational apps, and online simulations provide students with engaging reading materials that align with their interests and academic goals. These resources often include multimedia elements such as videos, animations, and interactive diagrams, which help students visualize complex concepts and understand texts better. Additionally, digital tools can offer immediate feedback, track progress, and personalize

learning experiences. By engaging students with a variety of digital reading materials, technology not only enhances reading comprehension but also makes reading more engaging and accessible.

6. Bridging Real-World Applications with Academic Knowledge

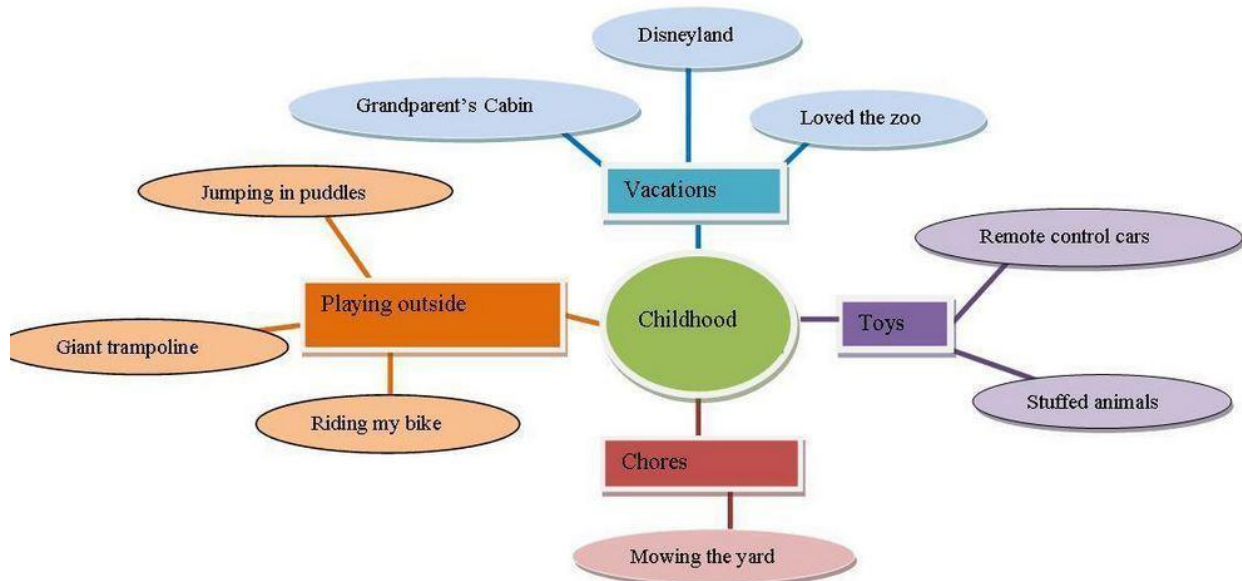
STEAM education connects academic concepts to real-world applications, making reading more relevant and engaging for students. Whether it's reading a news article about a recent scientific breakthrough, understanding environmental issues, or exploring the latest technological trends, students can see the practical applications of what they read. This context gives purpose to their reading and encourages them to seek out more information, fostering a lifelong love of reading. For instance, a student might read about climate change in a science class and then work on a project to design a sustainable city. This type of integrated learning helps students understand the importance of the subject matter, deepens their reading comprehension, and encourages further exploration of the topic.

STEAM education offers a unique and holistic approach to improving students' reading skills by integrating creative, critical, and analytical thinking into every aspect of learning. By engaging students in interdisciplinary projects, hands-on activities, and collaborative learning experiences, STEAM nurtures a deeper connection to reading and fosters a more comprehensive understanding of texts. The interdisciplinary nature of STEAM ensures that reading is not just a solitary task but a key component of active, engaging, and purpose-driven learning.

As educators embrace STEAM, they empower students to develop the skills necessary for academic success and equip them with the tools to be critical thinkers, problem solvers, and lifelong learners. Through the power of reading, students gain access to new worlds, ideas, and possibilities, all while gaining valuable skills that will serve them well in their future endeavors.

The integration of STEAM education into the classroom provides a wealth of opportunities for improving students' reading skills. From encouraging critical thinking to fostering inquiry, creativity, and digital literacy, STEAM offers an enriching, multi-dimensional approach to literacy development.

In developing reading competence in English classes, we focused on three stages of working with text: pre-reading, while-reading, and post-reading. These stages refer to activities before working with the text, during the reading process, and after the text has been read. This method of working with texts has several advantages. For instance, pre-reading activities are tasks that students perform before reading the text, which help improve the overall reading process. Harmer refers to this type of exercise as a "Lead-in" [5;69]. An example of a pre-reading activity is the "Brainstorming" technique. The teacher poses questions related to the topic of the text and gathers students' responses. During this activity, it is effective to visually organize students' ideas on the board using the "Cluster" technique. For instance, if the text is on the topic of "Childhood," the teacher may ask students questions such as "What do you remember about your childhood?" or "What comes to your mind when you hear the word 'childhood'?" The teacher can then record each student's response on the board in the form of a cluster diagram, as illustrated below.



Picture 1. Cluster Method

Unlike traditional approaches, the suggested content component of the pre-reading stage differs in that it involves discussion of a real-life issue — sometimes emotional and serious, at other times engaging — which is thematically connected to the information presented in the upcoming text. [4;45] In traditional methods, this stage typically focuses on addressing pronunciation, grammar, and vocabulary difficulties and predicting the content of the text based on its title or teacher's guiding questions. During the while-reading stage, students work directly with the text. The primary aim of this stage is to comprehend and internalize the information presented. Effective strategies at this stage include:

Topic Sentence Identification: Each paragraph contains one sentence that carries the main idea. Students are encouraged to read carefully, identify the topic sentence, and support their choice with evidence from the paragraph. *Jigsaw Reading:* The class is divided into small groups of 5–6 students. A text composed of several paragraphs is split so that each student receives one paragraph. After reading their individual sections, students collaborate to analyze the entire text collectively.

In the post-reading stage, oral tasks are typically used to reinforce comprehension: *Discussion:* Students are divided into small groups (3–4 members) and given discussion questions related to the text. These may involve analyzing characters, their behavior, identifying the most engaging aspects of the text, and reflecting on the lessons learned. *Story Continuation:* After reading, students are given a short amount of time to imagine and articulate a logical continuation of the text based on their understanding.

To assess and enhance students' comprehension after reading, Bloom's Taxonomy can be applied. Developed by Benjamin Bloom and his colleagues, Bloom's Taxonomy is a framework that categorizes levels of cognitive understanding into six stages. These are generally divided into two main categories:

LOT (Lower Order Thinking) – basic recall and understanding, which require minimal cognitive effort.

HOT (Higher Order Thinking) – analysis, evaluation, and creation, which demand more advanced levels of critical thinking. Each of these categories is further broken down into subcategories that guide educators in designing tasks and questions that promote deeper learning and understanding.

Remember	Draw a picture of your terrarium
Understand	Describe the procedures you used to put your terrarium together
Apply	Put worms and a variety of “garbage” into your terrarium. Record your observations over a week. Explain what you saw
Analyze	Compare and contrast the lives of plants and animals in a terrarium.
Evaluate	A housing developer wants to buy a large section of your town and build very expensive homes there. Write a letter to the editor of the newspaper about your opinion of this idea.
Create	Based on what you have learned about ecological systems, develop a plan for what the government could do to preserve your town(the wooded area near the river)

Table 2. Sample task that can be used in English classes**CONCLUSION AND RECOMMENDATIONS**

In conclusion, it can be stated that, as outlined in the decisions and decrees of our country's leadership, as well as in the national education standards, curricula, and academic plans, the integration of STEAM education technology into the various levels of the national education system remains a crucial issue today. Accordingly, developing one of the key speech competencies—reading competence—of high school students in English classes through STEAM technologies offers several advantages. It contributes to the development of learners' creativity, problem-solving, and critical thinking skills. Moreover, working with STEAM-related texts in English lessons increases students' interest in STEAM professions, which are considered the careers of the future.

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