THE USE OF ARTIFICIAL INTELLIGENCE IN TEACHING ENGLISH FOR COMPUTER SCIENCE STUDENTS

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Abstract. Artificial Intelligence (AI) has been increasingly integrated into educational systems, transforming how languages, particularly English, are taught. This integration is highly relevant for computer science students, who often need English proficiency to access resources, collaborate internationally, and keep up with rapid technological advancements. We accept without argue that AI itself is a field of computer science. This article examines the use of AI tools and methodologies in teaching English to computer science students. We analyse AI-driven applications such as: ChatGPT, Natural Language Processing (NLP) Tools, Personalized Learning Platforms, and Automated Assessment and Feedback Tools. These all-automated tutoring systems, and data analytics is used as methods to enhance language proficiency. AI-driven applications for teaching English to computer science students allow for more targeted, efficient, and contextually relevant language acquisition, addressing both general English proficiency and discipline-specific language skills. There are three important findings discussed in this article. Those give evident that 1) AI technologies can improve technical vocabulary, 2) AI technologies can increase student engagement, and 3) AI technologies can tailor learning experiences. Over all these finding has proven that AI can improve language comprehension and providing significant benefits for computer science students.
Key words: *artificial intelligence, English for computer science, automated tutoring system, computer science education, personalized learning, ChatGPT, NLP*

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1. Introduction

English is the dominant language in information technology, since we know that English is The International Language. The domination of English can be seen from historical development of computing and IT. Much of the early development in computing, programming, and information technology took place in English-speaking countries, primarily the United States. Early innovators, companies, and research institutions established terminology, documentation, and standards in English, setting a linguistic precedent that continues today. English is also the Language of Major IT Companies. Leading tech companies like Google, Microsoft, Apple, Amazon, IBM, and Facebook were founded in English-speaking countries, primarily the U.S. These companies publish most of their documentation, user manuals, technical guidelines, and research in English, establishing it as the industry's primary language.

The use of English in computing and programming is both foundational and widespread. English permeates nearly every aspect of programming, from the language syntax to documentation, collaboration, and resources. Most programming languages use English keywords and syntax, which has become a standard. For instance, almost all programming languages use terms like*: if, else, while, for, return, print* etc. This standardization has created a universal structure that enables people from various linguistic backgrounds to learn and work within a consistent framework. These key words (*if, else, while, return, print*, etc) are widely used in programming including Python, Java, JavaScript, and C++. They were developed in English-speaking contexts.

Output error messages and warnings in programming also written in English. So, it is very important for programmer to understand this error message. We can say that understanding these messages is crucial for debugging, as they provide specific clues to help resolve issues. Even error logs

and stack traces are also provided in English, encouraging English proficiency for efficient troubleshooting.

In PGRI Kalimantan University, English for computing science is taught early in the first semester. As one of essential subject, English for computing science provides essential access to resources, facilitates communication, and prepares students for global professional environments. The subject is taught in English-based syntax. It means that learning these languages also requires some English understanding. This standardization in English not only simplifies learning for new programmers, but it also reinforces English as the default language for writing and reading code globally. In global scientific discourse, English language proficiency has become a vital skill for computer science students.

Conventional language teaching often falls short in addressing the unique learning needs of the students. We need other way and method to help student to understand the technical terms in computing dan programming. In this case we need AI for solutions, from personalized learning systems to real-time feedback mechanisms, present novel opportunities to create customized language instruction that adapts to each student's pace, background, and preferences.

Artificial Intelligence (AI) is a branch of computer science focused on creating systems or machines that can perform tasks that would typically require human intelligence. These tasks include learning from experience, understanding natural language, recognizing patterns, making decisions, and solving problems. Expert says that the beginning of AI development, researchers began efforts to develop computer programmes that could simulate human learning abilities. (Nuryadin, Riki and Marlina, 2023). Artificial Intelligence (AI) is a field of computer science concerned with the development of computer systems capable of performing tasks that normally require human intelligence. According to McCarthy (Mccarthy, 2007), one of the founders of AI, AI is the science and engineering that deals with creating intelligent machines, especially intelligent computer programs. This paper explores the various AI tools and methodologies used to enhance English language acquisition among computer science students, emphasizing the importance of AI in making learning adaptive, efficient, and engaging.

2. Literature Review

AI in language learning is a growing field, with many studies supporting the use of AI-based tutoring systems, natural language processing (NLP), and machine learning to improve outcomes. Research shows that personalized AI-driven content enhances retention and motivation. Moreover, studies have shown that students' engagement with AI-powered tools, such as chatbot and language assessment systems, results in higher language proficiency.

A chatbot is a software application designed to simulate and process human conversation, allowing users to interact with it through text or voice interfaces. Chatbots can range from simple systems that respond to specific keywords to complex AI-driven platforms that can understand and generate human-like responses. A highly intelligent chatbot by the name of ChatGPT first appeared in late 2022, showcasing a cutting-edge capacity to react to difficult questions by creating text-based queries. Today, a variety of organizations, including journalists and content writers, have begun to investigate ChatGPT's possibilities for delivering text material on a variety of themes and participating in discussions with almost flawless grammatical language (Puspitasari A, et.al. 2024)

ChatGPT is an advanced conversational AI built by OpenAI, based on the GPT (Generative Pre-trained Transformer) architecture. It is designed for open-ended, natural conversations and can handle a wide variety of topics and tasks. ChatGPT works as NLP. It is one of the branches of science Artificial Intelligence that studying communication between humans and computers through natural language (Hormansyah & Utama, 2018). Now days, ChatGPT is very common for students and lecturers in Universitas PGRI Kalimantan. They use it to help them solving any problem about education. The creation of language models, which was pioneered by OpenAI, can be linked to the antecedent history of ChatGPT. To attain artificial general intelligence, the research organization OpenAI has focused a ot of attention on the creation of sophisticated language models. Highly autonomous systems with extraordinary efficiency are referred to as artificial general intelligence when they beat humans at economically advantageous tasks. (Chukwuere, J.E. 2024)

As a product of technology, NLP and its construction in chatbot platforms are widely used in various human interests, including in this discourse the use for sales. Many businesses currently use chatbot artificial intelligence to support company work, one of which is in the marketing sector. Some research related to chatbot development in business is research on chatbot design that is used to improve business performance by recording orders, order processing, customer records, business locations, and financial transactions (Amalia & Wibowo, 2019).

Natural Language Processing (NLP) is a tool to process spoken or written language of human being in everyday conversations through computer. The computational process must be represented into a series of symbols that fulfil certain rules. In the process, NLP will make computer can understand any commands or standard language that is commonly written or performed by humans. The input of the commands entered by the user will be answered by the application of ChatGPT. It can be applied in the form of NLP (Natural Language Processing) which is one of the fields of Artificial Intelligence) to study communication that is by humans with computers through natural language.

Despite these advancements, limited research has focused specifically on using AI to teach English to computer science students. This gap highlights the need to study AI-driven language acquisition methods tailored for the needs of computer science learners.

3. Method

This study used an experimental approach to analyse the effectivity of AI tools in teaching English to computer science students. We assessed the effectiveness of AI-driven tools Namely ChatGPT. It is Used to simulate real-life written conversations in English and help students practice to write English sentences using technical terminology in computer science. The research follows a qualitative data collection technique. This approach allows for a comprehensive analysis of the impact of AI tools on students' learning experiences. This is also used to gain insights into students' perceptions, experiences, and feedback on using AI tools in the learning process. The study aims to answer the following research questions: What are the roles of AI tools in teaching English for computer science? The researcher will observe the students while they complete tasks (e.g. technical-English writing tasks) to compare engagement, focus, and the efficiency of AI in assisting with language challenges. This study involved the computer science students of STKIP PGRI Banjarmasin enrolled in English language courses at the first semester. The research aims to provide insights into how AI tools can enhance English language learning for computer science students by tracking their progress, improving their engagement, and providing personalized assessments. The findings could contribute to the development of more effective AI-based language learning strategies tailored to the unique needs of computer science students.

4. Results and Discussion

The results indicated substantial improvements in English proficiency and language confidence among the participants. Key findings include:

AI Technology Can Improved Technical Vocabulary:

Using AI in teaching English to computer science students can significantly improve their technical vocabulary. AI tools can adapt to each student's learning pace and knowledge level. For computer science students, AI can generate exercises focused on technical terms like "algorithm," "encryption," or "compiler." By customizing content, students are exposed to vocabulary relevant to their field, ensuring they learn words that are practical and meaningful to them.

Here are some exercises generate by AI focused on technical terms like **algorithm**, **encryption**, and **compiler**, designed to enhance understanding and retention of these terms: This type of exercise typically very important to be implemented both by teacher and student.

a. Match each technical term to its correct definition:

Technical Term	Definition
Algorithm	A step-by-step procedure for solving a problem or completing a task.
Encryption	A process of converting data into a coded form to protect it from unauthorized access.
Compiler	A program that translates source code written in a programming language into machine code.

b. Complete the sentences using the correct technical term (**algorithm**, **encryption**, or **compiler**):
   1. The _____ ensures that sensitive data sent over the internet is protected from hackers.
   2. A sorting _____ is used to organize data in ascending or descending order.
   3. Without a _____, the code written in Python would not run on a computer.
c. Decide whether each statement is true or false:
   1. An **algorithm** is only used in computer science.
   2. **Encryption** ensures that only authorized users can read the data.
   3. A **compiler** can execute the code directly without translating it into machine language.
d. Scenario-Based Questions
   1. You are designing a password manager. Which process would you use to protect users' passwords: **algorithm**, **encryption**, or **compiler**? Explain your choice.
   2. Your team needs to organize a list of user data efficiently. Would you use an **algorithm**, **encryption**, or **compiler**? Why?
e. Word Formation
   Form sentences using the following technical terms:
   1. Algorithm   2. Encryption   3. Compiler
   Example: "The programmer used a **compiler** to convert the source code into an executable file."
f. Crosswords or Word Search
   Include technical terms as part of a puzzle where students need to find words like **debugging**, **syntax**, **database**, **algorithm**, **encryption**, and **compiler** in a grid or complete a crossword with their definitions.

These exercises not only test knowledge but also encourage critical thinking and practical application of technical vocabulary.
Here is an example list of **relevant vocabulary for computer science students** learning English.
This vocabulary also generates by AI (Chat GPT) and It may able to generate more:

- **CPU (Central Processing Unit)**: The brain of the computer that executes instructions.
- **Cache**: A small, fast memory for storing frequently used data.
- **Motherboard**: The main circuit board connecting all computer components.
- **Peripheral**: External devices like a mouse, keyboard, or printer.
- **Bus**: A communication system that transfers data between components.
- **Encryption**: The process of converting data into a secure, coded format.
- **Firewall**: A system that blocks unauthorized access to a network.
- **Protocol**: A set of rules for data communication (e.g., HTTP, FTP).
- **IP Address**: A unique identifier for a device on a network.
- **Server**: A computer that provides data or services to other computers.
- **Client**: A device or program that accesses services from a server.
- **Packet**: A unit of data sent across a network.
- **DNS (Domain Name System)**: Translates domain names into IP addresses.

This vocabulary list is directly applicable to computer science contexts, making it highly relevant for both academic and professional communication in English.

AI Technology Can Increase Student Engagement

AI can increase student engagement in teaching English to computer science students, we can analyze the following points with practical examples and evidence-based reasoning: AI tools adapt content to individual learning levels, interests, and progress. For computer science students, AI platforms can integrate technical content, such as programming vocabulary and concepts, into English lessons.

Evidence:

- Adaptive learning systems like Duolingo and Grammarly improve engagement by tailoring tasks to the learner's proficiency.
- Example: A computer science student might receive exercises like analyzing the syntax of programming languages while learning English grammar.

Impact:

When lessons feel relevant to their field of study, students are more likely to stay engaged.

AI can integrate gamified elements into learning, like quizzes or challenges where students decode programming jargon or explain concepts in layman's terms. **Layman's terms** refers to simple, easy-to-understand language that avoids technical jargon, complex terms, or specialized vocabulary. It's a way of explaining something so that anyone, regardless of their background or expertise, can understand it.

Example:

- **Technical Language:** "The compiler translates high-level programming code into machine-readable instructions."
- **Layman's Terms:** "A compiler is a tool that changes the code you write into a language the computer can understand."

Using layman's terms is especially helpful when communicating with people who may not have expertise in a specific field, such as when explaining complex topics to beginners, non-technical audiences, or clients.

AI Technologies Can Tailor Learning Experiences

Tailor learning experience means customizing or personalizing the learning process to fit the unique needs, abilities, preferences, and goals of individual students. Just like a tailor adjusts clothing to fit someone perfectly, educators or tools (like AI) adjust teaching methods, materials, and activities to suit each learner's specific requirements.

For example:

- If a student is struggling with technical English vocabulary, the learning experience might focus more on that area.
- For an advanced learner, the content might include more complex technical discussions or writing tasks.

By tailoring the learning experience, students are more likely to stay engaged, progress at their own pace, and achieve better outcomes.

AI can tailor the learning experience for computer science students studying English at least by these five ways:

1. Focusing on relevant vocabulary.

   Teaching relevant vocabulary is crucial when helping computer science students learn English because it ensures the language, they acquire is directly applicable to their academic and professional needs. Relevant vocabulary refers to words, terms, and phrases that are specifically aligned with a student's field of study or work. For computer science students, this includes technical jargon, industry-specific terminology, and commonly used expressions in software development, hardware, networking, data science, and more. By focusing on relevant vocabulary, teachers empower computer science students to seamlessly integrate language learning into their technical expertise, ensuring they are prepared for both academic success and professional growth.

2. Adapting difficulty levels to match student abilities.

   Adapting difficulty levels in education means tailoring learning materials and tasks to align with a student's current knowledge, skills, and progress. For English learners, especially computer science students, this approach ensures that lessons are neither too easy (causing boredom) nor too difficult (causing frustration). Instead, it creates an optimal learning environment that keeps students challenged and motivated. Adapting difficulty levels ss important because: 1) **Enhances Engagement**: Students remain interested when lessons are at the right difficulty level for their abilities. 2) **Promotes Confidence**: Success with appropriately challenging tasks builds self-esteem and encourages continued learning. 3) **Optimizes Learning**: Gradually increasing complexity ensures steady progress without overwhelming the learner. 4) **Reduces Dropout Rates**: Students are less likely to feel discouraged and disengage from learning. To adapt difficulty levels in Teaching English to Computer Science Students can be done by: Assess Student Abilities and gradually increase vocabulary complexity. Adapting difficulty levels in teaching English ensures that computer science students gain the language skills needed for their field without feeling overwhelmed or disengaged. By meeting students where they are and challenging them appropriately, educators can create a supportive and effective learning environment.

3. Offering real-time feedback and corrections.

   Real-time feedback and corrections involve providing immediate responses to a student's errors or achievements during the learning process. This approach helps students identify and address mistakes promptly, improving their understanding and reinforcing correct usage. In teaching English to computer science students, real-time feedback ensures that they can quickly correct language errors and communicate technical ideas effectively. Offer Real-Time Feedback and Corrections can be done by giving oral feedback. For example: Correct pronunciation or usage during conversations or presentations. Or use prompts to guide students toward the correct answer rather than simply providing it. *Example*:

   A: Student: "The algoritm is not efficient."

   B: Teacher: "Good sentence! Remember, the correct spelling is **algorithm**, not **algoritm**. Let's repeat that together."

   Leverage AI-powered tools to give real-time corrections in grammar, spelling, and sentence structure. For example: **Grammarly:** Highlights errors and offers explanations. **Duolingo:** Provides instant feedback on vocabulary and sentence formation during exercises. And **Code Comments in English:** Tools like GitHub Copilot can correct technical phrasing in programming.

   Offering real-time feedback and corrections helps computer science students improve their English skills quickly and effectively. By addressing errors immediately, teachers can enhance comprehension, build confidence, and ensure students are equipped to use English in technical and professional contexts. This personalized and interactive approach makes the learning process more efficient and engaging.

4. Providing contextual and multimodal learning resources.

   Contextual and multimodal learning resources are tools, materials, and activities that combine meaningful real-world scenarios with diverse forms of media (text, visuals, audio, video, and interactive elements). For computer science students learning English, these resources can bridge the gap between theoretical knowledge and practical application, making learning more relevant, engaging, and effective. **Contextual learning** means teaching concepts by relating them to real-world situations or specific fields of study. For example, when teaching computer science students, English vocabulary and grammar lessons can incorporate scenarios. **Multimodal learning** involves using various formats (e.g., visuals, videos, interactive simulations, and written content) to appeal to different learning styles and reinforce understanding. For example, students can read an article on artificial intelligence, watch a related tutorial, and then practice describing AI concepts verbally or in writing.

Providing contextual and multimodal learning resources makes English education more practical and engaging for computer science students. By combining real-world relevance with diverse formats, educators can ensure students not only grasp language concepts but also apply them effectively in technical and professional settings.

5. Tracking progress and personalizing assessments.

Tracking progress and personalizing assessments are key components in creating an effective and student-centered learning environment. In the context of teaching English to computer science students, these practices help monitor individual progress, tailor learning experiences to specific needs, and ensure that students are mastering the necessary language skills at their own pace. Tracking progress refers to monitoring a student's development over time, understanding their strengths and areas for improvement. For computer science students learning English, tracking progress involves observing how they acquire technical vocabulary, grammar, writing, and speaking skills in relation to their field. This enables teachers to adjust lessons to ensure continuous growth. Personalizing assessments means tailoring tests, quizzes, assignments, and projects based on each student's individual needs, learning pace, and abilities. Rather than applying a one-size-fits-all approach, personalized assessments provide the opportunity for students to demonstrate their knowledge and skills in a way that aligns with their learning journey and current proficiency.

Tracking progress is important because it can: 1) **Identify Gaps in Learning**: Teachers can pinpoint specific areas where students struggle, such as technical vocabulary or grammar. 2) **Motivation and Confidence**: Seeing progress, even in small steps, encourages students to keep learning.3) **Adaptation to Student Needs**: Teachers can adjust teaching methods to suit individual student needs, ensuring they remain engaged. 4) **Better Outcomes**: Tracking ensures that no student is left behind, and all are moving toward their learning goals. On the other hand, personalizing assessments is used to:1) **Address Individual Strengths and Weaknesses**: Customizing assessments lets teachers focus on areas where a student may need more practice (e.g., vocabulary, speaking, or writing).2) **Varied Assessment Types**: Not all students show their understanding the same way. Personalizing assessments lets students showcase their skills through written tests, oral presentations, or practical tasks. 3) **Fairer Evaluation**: Personalization makes it easier to assess students based on their learning needs, rather than comparing them to a general standard.

Tracking progress and personalizing assessments are powerful methods for ensuring that students, particularly those studying English for computer science, are constantly improving in a way that is suited to their personal learning journey. By using these methods, educators can foster an environment where students are motivated, confident, and fully engaged in both their language learning and their technical education.

By integrating these capabilities, AI creates a customized, engaging, and efficient learning environment for technical English mastery.AI offers diverse learning materials, such as videos, interactive exercises, and audio lessons, tailored to different learning styles. For computer science students, this might include tutorials on technical presentations or listening exercises based on coding podcasts. Multimodal resources accommodate individual preferences, keeping learning engaging and effective.

5. Conclusion and Suggestion

AI offers promising applications for teaching English to computer science students, providing benefits such as 1) improving technical vocabulary, 2) increase student engagement and 3) tailor learning experience by a.) Focusing on relevant vocabulary, b) Adapting difficulty levels to match student abilities, c) Offering real-time feedback and corrections, d) Providing contextual and multimodal learning resources, and e) Tracking progress and personalizing assessments. As AI

technology advances, it will likely play an increasingly vital role in language education, particularly for fields where technical language proficiency is crucial.

To maximize the potential of AI in language learning for computer science students, educators should consider the following:

1. Implement AI Tools Across Curriculums: Incorporate chatbots, NLP, and personalized learning platforms to create a tailored language learning environment.
2. Balance AI with Human Instruction: Combine AI tools with human instructors to address complex language nuances and ensure a comprehensive learning experience.
3. Focus on Technical Vocabulary: Tailor AI language resources specifically for technical and programming terminology essential for computer science.

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