

THE POTENTIAL OF CHATGPT IN TEACHING/LEARNING PROGRAMMING

2nd International Conference on Teaching Programming Languages



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MAIN TOPICS

- What does Generative AI (e.g. ChatGPT) think about the topic of my presentation?
- How Generative AI Will Influence the Future of Software Programming?
- How will Generative AI influence computer science training curricula?
- How will Generative AI influence the way we teach programming languages?
- How will Generative AI influence the way students learn programming languages?
- How I see the future for the teaching of programming languages and programmers.



WHAT DOES CHATGPT THINK ABOUT THE TOPIC OF MY PRESENTATION?

- The potential of ChatGPT (or similar language models) in teaching and learning programming **is substantial** and **holds promise for enhancing the educational experience** in several ways:

- Interactive Learning
- Personalized Assistance
- On-Demand Tutoring
- Practice and Application
- Concept Reinforcement
- Coding Assistance
- Accessibility and Inclusivity
- Exploration of Advanced Topics
- Collaborative Learning
- Continuous Improvement

- Dependency and Overreliance
- Accuracy and Verification
- Ethical Concerns



HOW GENERATIVE AI WILL INFLUENCE THE FUTURE OF SOFTWARE PROGRAMMING?

- Reductions in time, increased productivity, and elevated software quality. How?
 - It's not really about just asking ChatGPT to do my job...
 - It's about incorporating AI-powered code generators (e.g. GitHub Copilot, AskCodi)
 - It's about developers focusing more on solving complex business problems
 - It's about higher creative thinking
 - It's about co-creating (the programmer + AI)
 - So it's, inspired by Lavoisier, not about creating, not about losing, but about transforming the role of the programmer (and programming)
 - Let's remember how we coded our first web page (if you are 45+ years old)



HOW WILL GENERATIVE AI INFLUENCE COMPUTER SCIENCE TRAINING CURRICULA?

- AI is expected to **significantly impact** the curricula of Bachelor's in Computer Science. How?
 - Emphasizing interdisciplinary skills (e.g., psychology, biology)
 - More Data Science and Big Data Analytics
 - More Machine Learning
 - More languages and frameworks used in AI development (e.g., Python, TensorFlow, PyTorch)
 - More Natural Language Processing (NLP) courses
 - More AI-driven robotics courses
 - `main = putStrLn "More Functional Programming ;-)"`



HOW WILL GENERATIVE AI INFLUENCE THE WAY WE TEACH PROGRAMMING LANGUAGES?

- Teachers can:
 - Integrate AI models into classroom activities (e.g., to provide explanations, coding assistance)
 - Encouraging students to interact with AI models during classes – promoting active learning
 - Customized learning paths for individual students (considering individual strengths and weaknesses)
 - Ask for more complex tasks (AI will help students do the simplest tasks quickly...)
 - Make students realize that good code is only generated when good and detailed reasoning is put into requests to generative AI platforms
 - After all, students still have to think correctly and in detail to get what they need



HOW WILL GENERATIVE AI INFLUENCE THE WAY STUDENTS LEARN PROGRAMMING LANGUAGES?

- For students, what changes is **a mirror of what changes for the teachers**
- Students can:
 - Dialogue with AI models (e.g., to ask questions, receive explanations, clarify concepts)
 - Have tailored assistance (24/7)
 - Have accessible learning resources
 - Apply theoretical knowledge in practical contexts
 - Have support to curiosity-driven exploration
 - We hope that also with awareness of the ethical issues that are due



HOW I SEE THE FUTURE FOR THE TEACHING OF PROGRAMMING LANGUAGES AND PROGRAMMERS

- Generative AI tools will have to be integrated into teaching, as have all other sources of information (e.g., Web forums, YouTube classes). And never banned!
- More students (from non technical areas) can and will be able to learn to program
- The assessment of curricular units will have to be rethought (e.g., practical work must have a presentation and oral assessment)
- Teachers and students **will only have** more tools at their disposal to teach/learn
- We will continue to have a model for acquiring and evaluating skills.
- What matters is ensuring the acquisition of skills... it is not relevant how they were acquired (considering ethical issues). Fraud will continue to result in non-acquisition of skills.
- And students and teachers are now more empowered ;-)



HOW I SEE THE FUTURE FOR THE TEACHING OF PROGRAMMING LANGUAGES AND PROGRAMMERS

- Programmers will continued to be needed:
 - Or to **perform more complex tasks** that are more difficult for AI
 - Or to **be teachers/tutors of machines** who want to learn and improve :-D

```
#include <iostream>
int main()
{
    std::cout<<"Thank You";
    return 0;
}
```

```
print("Thank You")
```



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