


Computing education is not just programming: What else ~~does generative AI~~ change?  
*do foundation models*

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Two issues with genAI in CER today:

1. Computing education is not just programming.

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2. The AI revolution is not just chat bots.

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Computer Science  
 ≠ Programming

Said every computing educator since the 1970s

But still, I felt like C(S)E(R) was the study of how to best teach programming.

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Computer Science  
 ≠ Programming

Programming is unique to computing, but so are topics in

HCI, SE, IxD, TCS, IS, CE, Data science, Ethics of computing, Cybersecurity, etc.

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## Computer Science ≠ Programming

Or does it?  
Papers from ITiCSE 2023

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## Foundation models

Richer view on the DL(AI) revolution	Improved contextual relevance
Broader innovation base	Readiness for media convergence
Better curriculum coverage	Ethics & society understood deeper

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## LLMs

- LaMDA, GPT-3, Alpaca, etc.
- PaLM
- Claude 2
- GPT-4

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## Text-to-Image Generative Models

- Midjourney
- Dall-E
- Bing

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## Text-to-Audio Generative Models

- OpenAI Musenet
- Audiocraft

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## Scientific support

- Elicit
- Wolfram integration
- etc.

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## Text-to-3D Objects

- Point-E
- Shap-E

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## Text-to-Video Generative Models

- Gen-1 (Runway Research)
- Gen-2
- Pika

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## Generative VR Environments

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## Coping in a physical environment

- Robotics makers
  - Multimodal data (lidar, cameras, sensors, sound, etc.)
  - Tesla (Optimus)
- *“So our students can now just download a model, retrain a few layers, and hand in their project?”*

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## Understanding human intentions

- Multimodal (video, sound, text)
  - Moods, tones, etc.

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## Medicine

- Protein sequences, organic molecules, ...
- Multimodal models (medical images, structured data, clinical recordings)

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# Foundation models: Trained on broad data and easily adaptable

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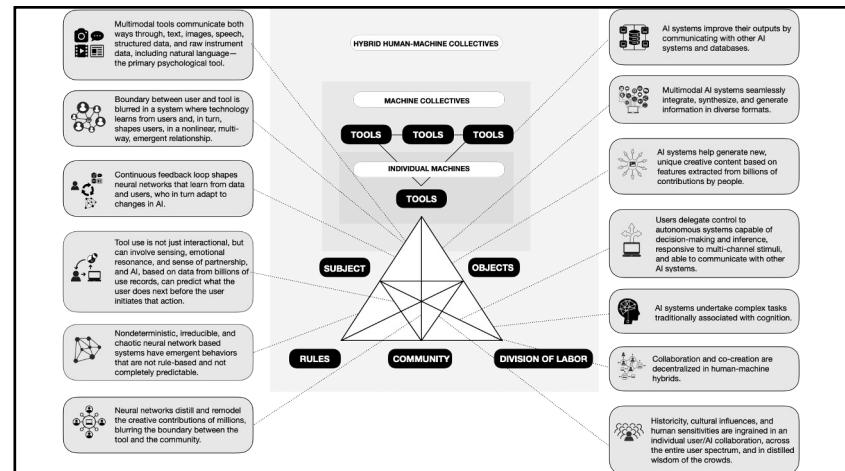
# Ecosystems

Meta, Alphabet, Microsoft, Amazon, Apple, Bytedance

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# Impact on computing education

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So what e/se in computing education do foundation models affect?

1. Courses and topics
2. Ethics of datafication
3. Learning environments
4. Philosophy
5. Pedagogy

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Computer Science  
≠ Programming

What does our ability to e.g. fine-tune foundation models change in computing education?

In...

- Capstone projects?
- BSc / MSc theses?
- Course contents?

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Ethics of Computing

Impacts on people, environment, etc.

- Foundation models can perpetuate and amplify existing inequalities, biases, power dynamics, injustice, structures, etc.

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Computing Education

Learning environments

- Interaction modalities
- Interactive learning environments
- Dynamic course content generation
- Real-time tutoring bots

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## Philosophy of Computing Education

(Greatly overlaps with the philosophy of computing, where these are discussed extensively)

- Methodology
- Epistemology
- Ontology
- Axiology

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## Computing Education = Education

Pedagogy & organization of education

- Curriculum
- Skill set
- Pedagogy
- Teaching aids

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# Thanks!

## Questions, comments?

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