

FUNDAMENTALS OF AI-AUGMENTED ENGINEERING: A CONVERSATIONAL APPROACH

Taner Onsay, Ph.D. & Sebnem Onsay
Authors
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Problem

›

Model

›

Compute

›

Analyze

›

Validate

›

Improve

*The engineering workflow you will use throughout this book
by Taner & Sebnem Onsay,*

CHAPTER - 1

PART 4 · ≈ 20 MIN

AI as Tutor & Programming Coach

4

AI's Weeks 1–2 role — and what never gets outsourced

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Let's ask AI to do our homework



PROMPT

"Write Python code to calculate the time required for a ball dropped from 2 meters to hit the ground."



Seconds later: correct equation, clean code, right answer, tidy explanation.

Impressive. Genuinely useful. And it raises the only question that matters ›

AI-generated

```
import math

h = 2.0    # drop height (m)
g = 9.81   # gravity (m/s^2)

# free fall from rest: h = 1/2 g t^2
t = math.sqrt(2 * h / g)

print(f"Fall time: {t:.3f} s")

Fall time: 0.639 s
```



What did the AI do? What does the engineer still own?



The AI...

- Selected an equation
- Generated working code
- Performed the calculation
- Explained the result clearly

*AI can assist with the right column too — if asked.
Accepting the answer is the part that never transfers.*



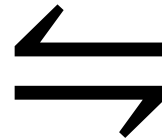
The engineer still owns...

- Was the ball dropped — or thrown? From rest?
- Is neglecting air resistance justified here?
- Is constant g appropriate? Units consistent?
- Was the height even measured correctly?
- Does 0.639 s make physical sense?
- How will we validate the prediction?

If AI learns from all recorded past human experience and
AI has vast **capacity**, who has **agency**?

HUMAN

COGNITIVE CREATOR & MORAL **AGENT**



AI

ENGINEERED EXTENDED COGNITIVE **CAPACITY**



Humans retain responsibility, AI extends cognition.

Capacity $\neq$ Agency

THE DEAL FOR THIS SEMESTER

AI may assist at every stage of the workflow.

Engineering responsibility cannot be delegated.

The short version: AI can generate — engineers must validate. Use AI actively and purposefully, but never outsource engineering judgment. You are responsible for everything you submit and defend.

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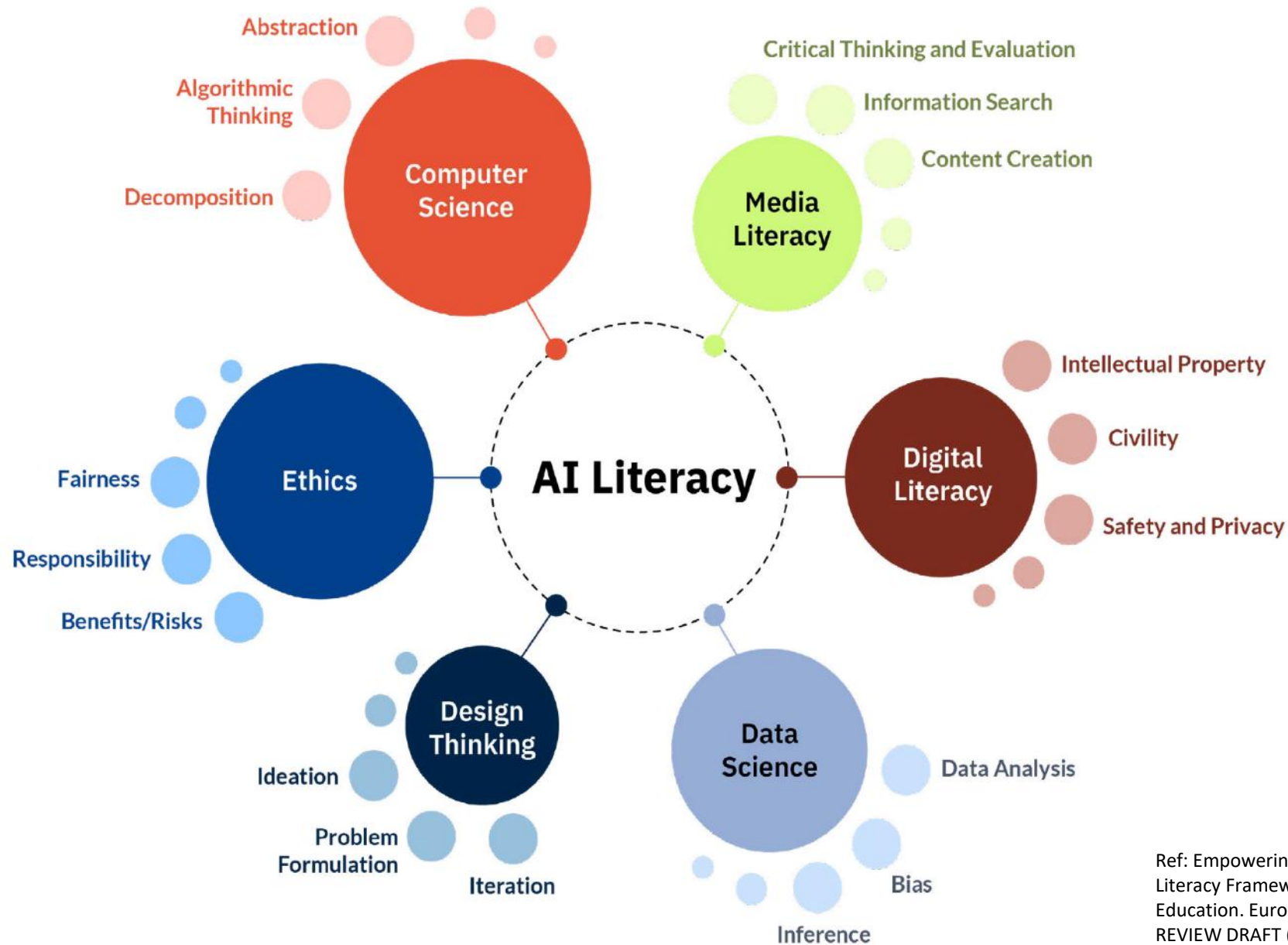
›

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›

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AI Literacy does not exist in isolation—it sits at the intersection of established literacies we already value



Ref: Empowering Learners for the Age of AI An AI Literacy Framework for Primary and Secondary Education. European Commission, OECD, Code.org, REVIEW DRAFT (May 2025)



AI › Investigate › Test › Human Help

1



AI

Use AI as a personal tutor.

“Explain how to solve $h = \frac{1}{2}gt^2$ for t , step by step.” ·
“I've never programmed — what does this line do?” · “Explain at high-school level, then engineering level.”

2



Investigate

Don't stop at the first answer.

Examine the equations, assumptions, and units. Check documentation and worked examples. Look for an alternative approach.

3



Test

Make the idea prove itself.

Run the code. Change inputs. Work a simple case by hand. Check units. Try extreme cases. Compare with another method.

4



Human Help

Still stuck or unsure? Good — ask.

Instructor · TA · classmates · academic support services. AI does not replace asking questions in class.

This protocol is how you'll be expected to use AI on every assignment.



Different backgrounds are the normal case

"I haven't programmed much."

"I forgot some of my algebra."

"I've never used Python."

"Everyone else seems ahead of me."

Every one of these is common — and, for the first time, every one has an on-demand, personalized AI tutor — patient and always available. Use it to rebuild exactly the prerequisite you're missing, at exactly your pace.

TWO THINGS ARE TRUE

You do not have to know everything before you begin.

You do have to understand what you ultimately submit and defend.

Being new to programming is not a disadvantage in this course. Skipping the understanding is.