



# Best Practices of the Use of AI in HE: Teacher Perspective

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 @cdk100s



## Everything is about to Change

- Mustafa Suleyman: *The Coming Wave*
- [the-coming-wave.com](http://the-coming-wave.com)



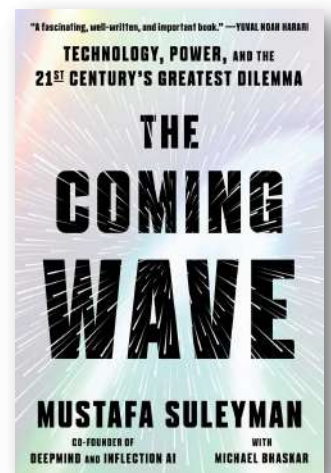
**WE ARE APPROACHING A CRITICAL THRESHOLD IN THE HISTORY OF OUR SPECIES. EVERYTHING IS ABOUT TO CHANGE.**

This is a story of 21st century technology, why it matters so much and what we can do to make it work for everyone.

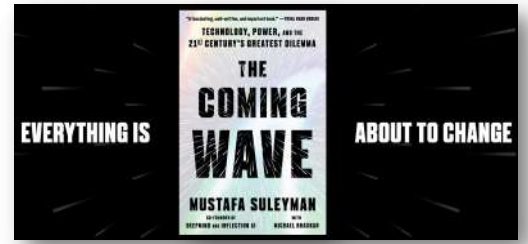
Soon we will live surrounded by AIs. They will carry out complex tasks—operating businesses, producing unlimited digital content and running core government services.

The coming wave will make this next decade the most productive in history. It represents nothing less than a step change in human capability and human society, introducing both risks and innovations on an awesome scale.

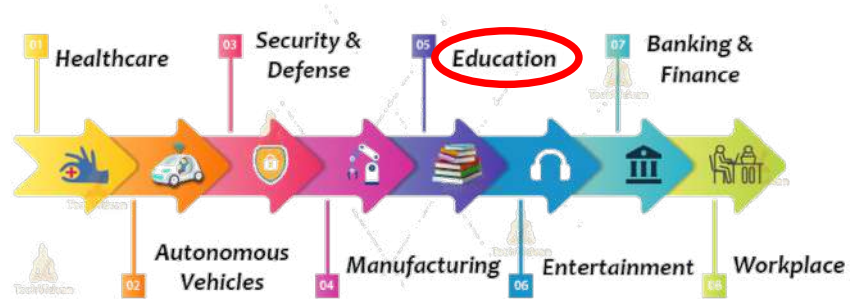
This is what is coming.



# Everything is about to Change



## Future of AI



## Outline

- 1. AI for Teaching
- 2. Not just Teaching
- 3. Beware!



# 1. How will AI Impact the Work of Professors for Teaching?



AI for Teaching



A. Understanding  
the Topics  
to Teach



B. Preparing  
Educational  
Material



C. Teaching  
the Class

# AI for Teaching



## A. Understanding the Topics to Teach

1. Research for course preparation



2. Document and video transformation



3. Proposals for syllabi

## 1. Research for Course Preparation

- The literature grows exponentially
- It is impossible to read everything about a particular topic
- One needs help to navigate through the relevant documents



# Generic vs.

- Generic GenAI Tools



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# Specific GenAI Tools



- Specific Research Assistants

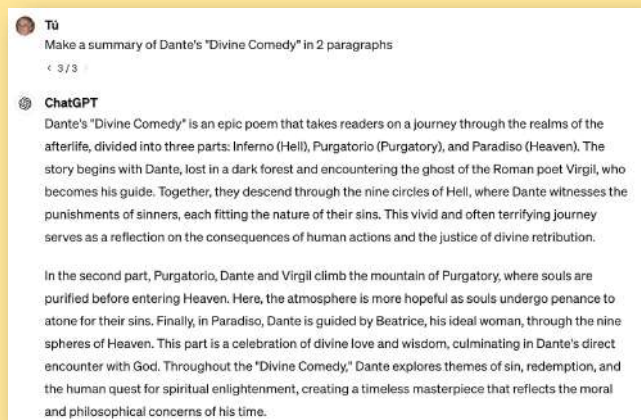


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## 2. Document and Video Transformation

- Summarization, Rephrasing
- Explanation of concepts
- Elaboration
- Change of style
- Examples and counterexamples
- Comparisons
- Role play

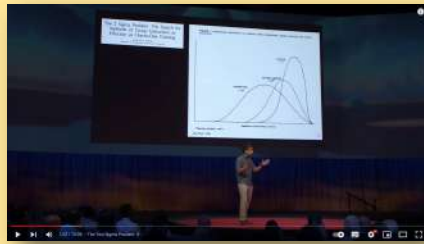




# Summarizing Videos

# Merlin

merlin.foyer.work

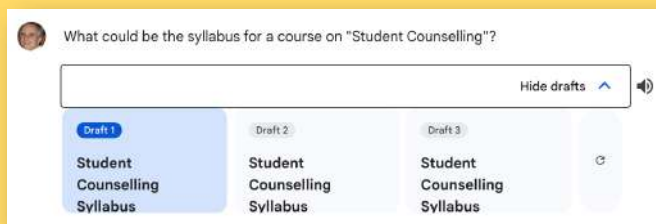


AI in education can be positive, with personal AI tutors and teaching assistants. It can improve student performance significantly.

- ◆ AI could be the biggest positive transformation in education 00:04
- ◆ Khanmigo AI tutors students in math and coding exercises, identifying mistakes and misconceptions. 02:14
- ◆ Khanmigo can act as a super tutor and provide guidance counseling to every student 04:15
- ◆ Students can talk to historical figures through AI-powered conversation 06:08
- ◆ Khanmigo uses generative AI to enhance reading comprehension and writing skills 08:00
- ◆ AI-powered writing coach and teacher's guide on steroids 09:53
- ◆ GPT-4's ability in math and tutoring improved dramatically by allowing AI to think before speaking. 11:47
- ◆ Active participation is key in deciding the future of AI 13:38



## 3. Course Syllabus



**Student Counselling Syllabus**

**Course Description:**

This course introduces students to the theory and practical applications of student counselling in various educational settings. Students will explore various theoretical considerations, and strategies for supporting the academic and career development of students. They will gain practical skills in building rapport, identifying student needs, and developing intervention plans.

**Course Objectives:**

- Define student counselling and its role in the educational setting.
- Explore various counselling techniques and intervention strategies.
- Understand the ethical considerations in student counselling.
- Develop skills in active listening, building rapport, and creating intervention plans to address students' academic and career concerns.
- Identify resources available to support students facing academic and career challenges.
- Develop cultural competence in counselling diverse student populations.

**Course Requirements:**

- Class participation (discussions, role-playing, case studies)
- Weekly readings and assignments
- Midterm exam
- Final project (e.g., case presentation, research paper)

**Grading:**

- Class participation: 20%
- Readings and assignments: 30%
- Midterm exam: 25%
- Final project: 25%

**Course Schedule (Subject to Change):**

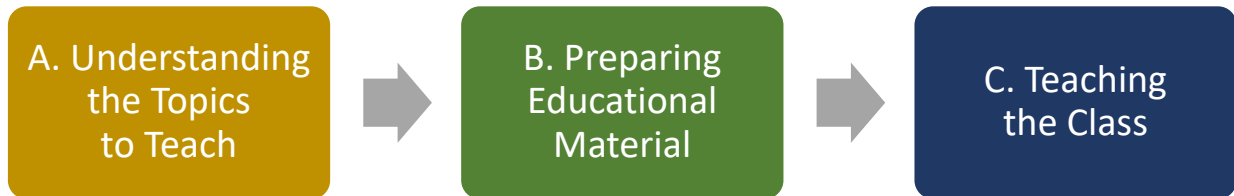
Week	Topic	Readings	Assignments
1	Introduction to Student Counselling	- Definition & purpose of student counselling - Roles and responsibilities of a student counsellor	- Bell (Why) interview
2	Theoretical Frameworks for Counselling	- Person-centered therapy - Cognitive-behavioral therapy - Solution-focused therapy	- Gen Comps contn coun
3	Active Listening and Building Rapport	- Importance of active listening skills - Techniques for building rapport - Ethical considerations	- Role-play scenarios - Ethical dilemmas
4	Assessment in Student Counselling	- Standardized and non-standardized assessments - Interviewing techniques - Ethical considerations in assessment	- Case analysis - Assessment plan
5	Counselling Skills for Academic Concerns	- Study skills and strategies - Time management - Addressing academic anxiety	- Dev skills plan f study
6	Counselling Skills for Social and Emotional Concerns	- Peer relationships - Bullying and conflict resolution - Anxiety and depression - Self-esteem and self-concept	- Develop a counselling plan to address a social or emotional concern
7	Counselling Skills for Career Development	- Career exploration and decision-making - Goal setting and resume building - Interview skills	- Create a career exploration plan for a student
8	Cultural Competence in Counselling	- Understanding cultural diversity - Bias and microaggressions - Culturally responsive counselling techniques	- Role-play scenarios - Cultural competence assessment
9	Crisis Intervention & Referral Procedures	- Identifying crisis situations - Suicide prevention - Collaboration with school personnel and community resources	- Develop a crisis intervention plan
10	Ethical Considerations in Student Counselling	- Confidentiality and privacy - Professional boundaries - Duty to report	- Case analysis - Ethical dilemmas
11	Midterm Exam		
12	Guest Speaker: School Counselor or Mental Health Professional (optional)		
13	Course Review & Final Project		

**Additional Resources:**

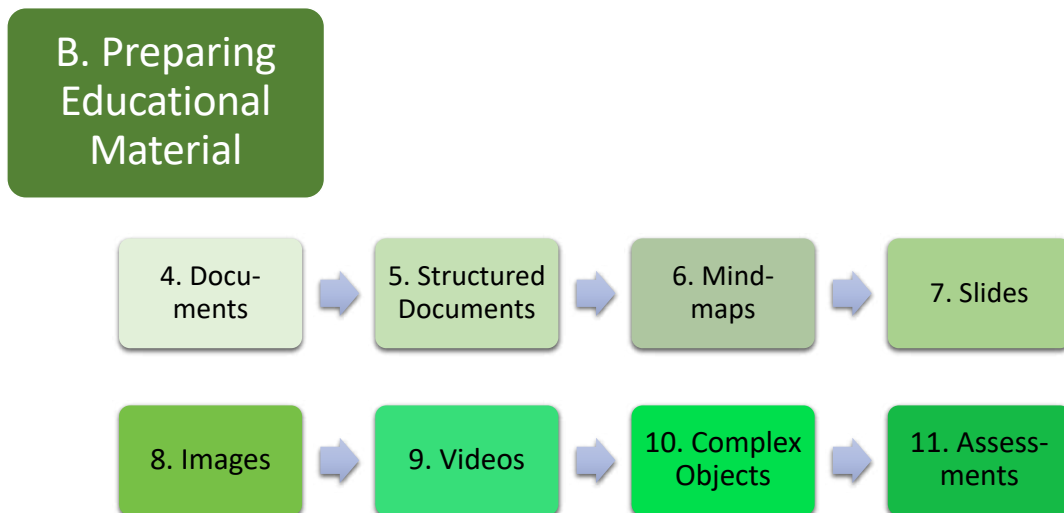
- American School Counselor Association (ASCA): <https://www.schoolcounselor.org/>
- National Association for College Admission Counseling (NACAC): <https://www.nacacnet.org/>
- The Trevor Project: <https://www.thetrevorproject.org/>

**Note:** This syllabus is a sample and may be adapted to fit the specific needs and resources of the course instructor and institution.

# AI for Teaching



# AI for Teaching



## 4. Documents

- Change style
  - eg. business language to slang
- Translate between languages
  - eg. English to Bahasa Malaysia
- Correct texts
  - eg. spelling and grammar errors
- Change formats
  - eg. from JSON to HTML



**Translate the following text to slang:** Open learning is a learner-centered philosophy: it recognizes the importance of learner control over the me, place, and pace of study. This philosophy animates distance education, which aims to make education and lifelong learning opportunities accessible to learners everywhere, especially those whose circumstances prevent them from availing themselves of conventional education. e-Learning, on the other hand, refers to learning that is facilitated or supported by new information and communications technology (ICT). Today e-learning is provided by both conventional universities, through what is called 'blended learning', and distance education on universities that engage in online distance education on or online learning, as well as by training institutes, alternative education on providers, and learning organizations."



Sure, here is the translation of the text into Bahasa Malaysia:

"Pembelajaran terbuka adalah falsafah yang berpusatkan pelajar: ia mengiktiraf kepentingan kawalan pelajar ke atas diri, tempat, dan kadar pembelajaran. Falsafah ini menghidupkan pendidikan jarak jauh, yang bertujuan untuk menjadikan peluang pembelajaran dan pembelajaran sepanjang hayat boleh diakses oleh pelajar di mana-mana, terutamanya mereka yang keadaannya menghalang mereka daripada mendapatkan pendidikan konvensional. Pembelajaran e-pula merujuk kepada pembelajaran yang difasilitasi atau disokong oleh teknologi maklumat dan komunikasi (ICT) baru. Hari ini pembelajaran e-disediakan oleh kedua-dua universiti konvensional, melalui apa yang dipanggil 'pembelajaran gabungan', dan pendidikan jarak jauh di universiti yang terlibat dalam pendidikan jarak jauh dalam talian atau pembelajaran dalam talian, serta oleh institut latihan, penyedia pendidikan alternatif, dan organisasi pembelajaran."

## 5. Structured Documents

```
<!DOCTYPE html>
<html>
  <body>
    <h1>Intestazione</h1>
    <p>
      <ul>
        <li>Primo punto con <b>testo in grassetto</b></li>
        <li>Secondo punto con <em>testo in corsivo</em></li>
      </ul>
    </p>
  </body>
</html>
```



### Intestazione

- Primo punto con **testo in grassetto**
- Secondo punto con *testo in corsivo*

Disegna in LaTeX un circuito elettrico con un resistore, un condensatore e un alimentatore in serie.

Per disegnare un circuito elettrico con un resistore, un condensatore e un alimentatore in serie in LaTeX, puoi utilizzare il pacchetto 'circuitikz'. Ecco un esempio di come fare:

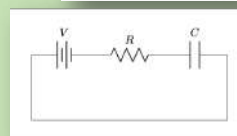
```
\documentclass{article}
\usepackage{tikz}
\usepackage{circuitikz}

\begin{document}

\begin{circuitikz}
\draw
  (0,0) to[battery, l=BVS1 (2,0) % Batteria da 9,0 e 2,0
  (0,1) to[R=2, l=R2 (4,0) % Resistenza da 2,0 e 4,0
  (0,2) to[C=4, l=C1 (5,0) % Condensatore da 4,0 e 6,0
  (0,3) to[ground, l=0,0] -- (0,0) % Chiave del circuito
\end{circuitikz}

\end{document}
```

Questo codice crea un semplice circuito con un resistore, un condensatore e un alimentatore (batterie) collegati in serie. Per compilare questo documento, assicurati di avere installato il pacchetto 'circuitikz'. Puoi utilizzare un editor LaTeX come TeXShop, TeXworks, Overleaf, o qualsiasi altro editor LaTeX compatibile.





# 6. Mindmaps



**Z** Can you write a Latex code of mind map that illustrates the working of chatgpt.

Certainly! Here's a sample LaTeX code for a mind map that illustrates the working of ChatGPT:

```

1 \documentclass{article}
2 \usepackage{tikz}
3 \usetikzlibrary{mindmap, arrows}
4
5 \begin{document}
6 \begin{tikzpicture}[mindmap, grow cyclic, every node/.style={font=\small, connect
7 style=none},
8 \textwidth=10cm, align=left, distance=1cm, sibling angle=90,
9 \textwidth=10cm, align=left, distance=1cm, sibling angle=90}]
10
11 \node[chatgpt]
12 {chatgpt}
13
14 \node[openai]
15 {openai}
16
17 \node[transformers]
18 {transformers}
19
20 \node[tokenizer]
21 {tokenizer}
22
23 \node[embedding]
24 {embedding}
25
26 \node[decoder]
27 {decoder}
28
29 \node[generator]
30 {generator}
31
32 \end{tikzpicture}
33 \end{document}

```

Generate a markdown code for a mindmap that shows how chatGPT works



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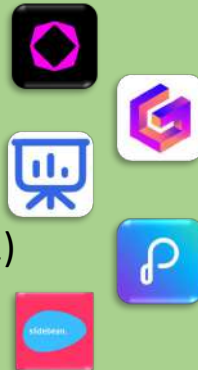
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# 7. Slides

- Tome ([tome.app](https://tome.app))
- Gamma ([gamma.app](https://gamma.app))
- SlidesAI ([slidesai.io](https://slidesai.io))
- PresentationsAI ([presentations.ai](https://presentations.ai))
- Slidebean ([slidebean.com](https://slidebean.com))



- Google Slides
- Microsoft PowerPoint



Google Slides



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## 8. Images

- Dall·e ([openai.com/product/dall-e-3](https://openai.com/product/dall-e-3))
- Midjourney ([midjourney.com](https://midjourney.com))
- Stable Diffusion ([stablediffusionweb.com](https://stablediffusionweb.com))
- Stockimg ([stockimg.ai](https://stockimg.ai))
- Letsenhance ([letsenhance.io](https://letsenhance.io))



## 9. Videos

- Synthesia ([synthesia.io](https://synthesia.io))
- Heygen ([heygen.com](https://heygen.com))
- D-ID ([d-id.com](https://d-id.com))
- Colossyan ([colossyan.com](https://colossyan.com))
- Invideo ([invideo.io](https://invideo.io))



# Speaking Perfect Italian



Voice cloning



Lip sync

# Avatar



Bene, è davvero buona idea.

# 10. Complex Objects



Claude artifacts and projects



```
ChatGPT 4o with canvas
View the code of a Linked List in Java
...
// Node class to represent each element of the LinkedList
class Node {
    int data;
    Node next;
}
// Method to add an element at the end of the list
public void addElement(int data) {
    Node newNode = new Node(data);
    if (isEmpty()) {
        head = newNode;
    } else {
        Node current = head;
        while (current.next != null) {
            current = current.next;
        }
        current.next = newNode;
    }
}
// Method to print all elements of the list
public void printList() {
    Node current = head;
    while (current != null) {
        System.out.print(current.data + " ");
        current = current.next;
    }
    System.out.println("");
}
```

Creare un artefatto visivo interattivo che spieghi il sistema ipotecario francese in cui puoi giocare con le variabili per il mutuo a tasso fisso

```
System.out.println("Calcolo della rata mensile");
// Input
double importo = Double.parseDouble(input);
double tassoAnnuo = Double.parseDouble(input);
int durata = Integer.parseInt(input);
// Conversione tasso annuo a tasso mensile
double tassoMensile = tassoAnnuo / 12;
// Calcolo della rata mensile
double rataMensile = importo * tassoMensile;
// Output
System.out.println("Rata mensile: " + rataMensile);
```



# 11. Assessments and Rubrics

- Generate quiz questions with
  - general purpose AIs: ChatGPT, Gemini, Claude



- AI-based applications specialized on the task: PrepAI, Quillionz



- Quiz platforms that have added AI features: Quizlet



You are an experienced professor of Java Programming. Create a quiz with 4 multiple-choice questions, each with 4 responses, of which one shall be the correct one. The topic is recursion in Java. Be creative.

**Recursion in Java Quiz**

Question 1: What is recursion in Java programming?

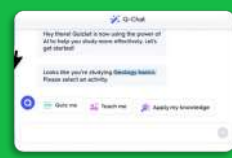
A) A technique to optimize loops.  
 B) A method that always returns the same value.  
 C) A programming concept where a method calls itself to solve a problem.  
 D) A way to handle random numbers in Java.

Correct Answer: C) A programming concept where a method calls itself to solve a problem.

Question 2: Which of the following is NOT a key element of recursion?

A) Base Case  
 B) Recursive Case  
 C) Looping Statement  
 D) Reduction of Problem Size

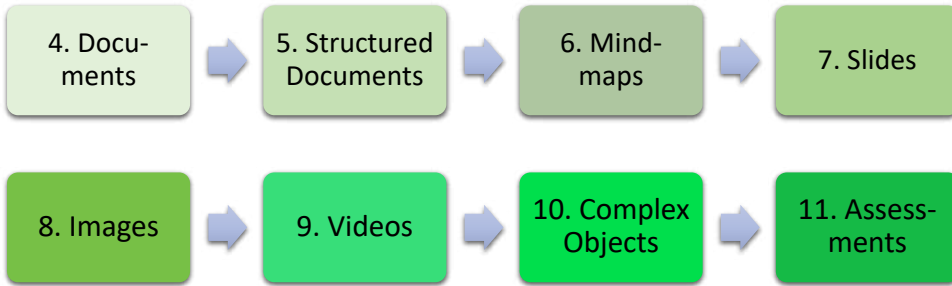
Correct Answer: C) Looping Statement



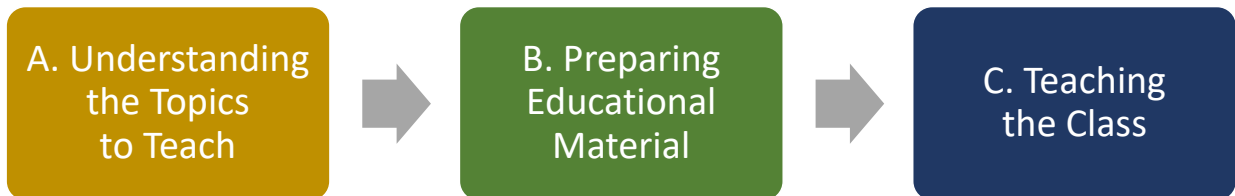
# AI for Teaching



## B. Preparing Educational Material



# AI for Teaching

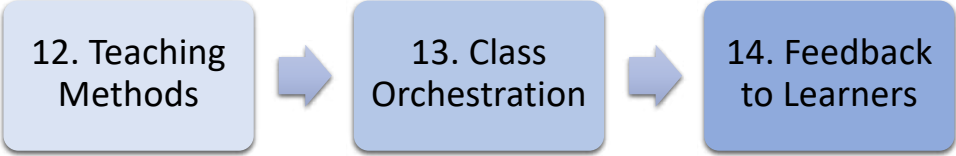




# AI for Teaching



## C. Teaching the Class



## 12. Teaching Methods

**You**  
Please suggest 3 teaching methods to teach recursion in the context of a Java programming course

**ChatGPT**  
Teaching recursion in a Java programming course can be challenging, but it's an important concept for students to understand. Here are three effective teaching methods:

1. **Visualizations and Analogies:**

- **Tree Diagrams:** Recursion often involves a tree-like structure. Use visualizations such as tree diagrams to represent the recursive calls and how they lead to smaller subproblems.
- **Mathematical Induction Analogy:** Draw parallels between recursion and mathematical induction. Show how solving a base case and assuming the solution for a smaller case can lead to the solution of a larger problem.
- **Stack Frames Analogy:** Explain the concept of stack frames in the context of method calls. Each recursive call creates a new stack frame, and the process continues until the base case is reached.

2. **Interactive Examples:**

- **Live Coding Sessions:** Perform live coding sessions to demonstrate recursive algorithms. Write code incrementally, showing how each recursive call contributes to solving the problem.
- **Trace Tables:** Create trace tables to help students visualize the state of variables and method calls at each step of the recursion. This can aid in understanding the flow of execution.
- **Debugging Exercises:** Provide students with deliberately flawed recursive code and ask them to debug it. This hands-on approach allows them to understand common pitfalls and strengthens their problem-solving skills.

3. **Problem-Solving Exercises:**

- **Progressive Problem Sets:** Design a set of programming exercises with increasing levels of complexity, starting from simple base cases to more intricate recursive solutions. This gradual progression helps students build confidence.
- **Real-World Examples:** Show real-world examples where recursion is a natural and efficient solution. For example, parsing and processing hierarchical data structures like XML or JSON can be a practical application of recursion.
- **Collaborative Problem Solving:** Encourage group work on recursive problem-solving exercises. Collaboration allows students to share insights and learn from each other's approaches. It also promotes a deeper understanding of the recursive thought process.

By combining these teaching methods, you can cater to different learning styles and help students grasp the concept of recursion in Java more effectively. Remember to provide ample opportunities for practice and encourage students to apply recursion in various programming scenarios.

# 13. Class Orchestration



**You**

Please generate a script to orchestrate a 50 minute class session to teach recursion in a Java programming class. Include collaborative tasks.

**ChatGPT**  
**Class Session Plan: Teaching Recursion in Java (50 minutes)**

Note: Adjust the timing based on the pace of your class and the level of familiarity your students have with recursion.

**Objective:**

- Understand the concept of recursion in Java.
- Learn to design and implement recursive algorithms.
- Apply recursion to solve programming problems.

**Materials:**

- Whiteboard and markers
- Projector for code demonstrations
- Laptops or computers for students
- Collaborative problem-solving handouts

**Class Structure:**

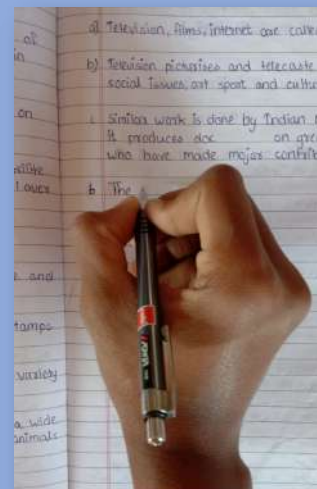
- Introduction (5 minutes)**
  - Briefly review the concept of methods/functions in Java.
  - Introduce the concept of recursion and its relevance in programming.
  - Explain the basics: a method calling itself, base case, and recursive case.
- Visualizing Recursion (10 minutes)**
  - Use a whiteboard or projector to draw a simple recursive tree diagram for a common problem (e.g., factorial, Fibonacci).
  - Discuss the tree structure and how it relates to recursive calls.
  - Introduce the concept of a base case and demonstrate its importance in preventing infinite recursion.
- Live Coding Session (15 minutes)**
  - Perform a live coding session to implement a simple recursive algorithm (e.g., factorial, Fibonacci) on the projector.
  - Explain each step, emphasizing the recursive calls and how they contribute to solving the problem.
  - Encourage students to ask questions during the coding session.

- Interactive Example and Tracing (10 minutes)**
  - Distribute a handout with a partially completed recursive code and a trace table.
  - In pairs, students complete the code and trace the execution on the table.
  - Discuss the solutions as a class, focusing on understanding the recursive flow.
- Collaborative Problem-Solving (5 minutes)**
  - Divide the class into small groups.
  - Assign a more challenging recursive problem to each group (e.g., recursive tree traversal).
  - Each group collaboratively designs and implements a recursive solution.
  - Encourage groups to discuss and solve challenges together.
- Group Presentations and Discussion (5 minutes)**
  - Each group presents its solution to the class.
  - Discuss different approaches, optimizations, and potential pitfalls.
  - Encourage questions and feedback from the class.
- Conclusion and Assignment (5 minutes)**
  - Summarize key points about recursion in Java.
  - Assign a homework exercise involving recursion for further practice.
  - Emphasize the importance of applying recursion to solve real-world programming problems.

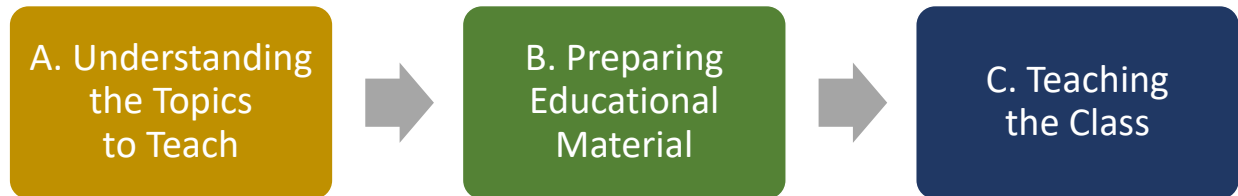
**Closing Note:**  
Encourage students to practice recursion outside of the classroom and explore its applications in programming. Emphasize that mastering recursion requires regular practice and exposure to diverse problem-solving scenarios.

# 14. Feedback to Learners

- Automated feedback to open questions
  - With revision by instructor
- Automated questions to submitted work
  - To check authorship



# Summary: AI for Teaching



## 2. Not Just Teaching





# Not just Teaching: also, What to Teach

- GenAI will have an impact on all professions
  - Computer Scientists
  - Engineers
  - Journalists
  - Lawyers
  - Economists
  - Medical doctors
  - Architects
  - Artists, ...

**Select Generative AI Use Cases by Industry**

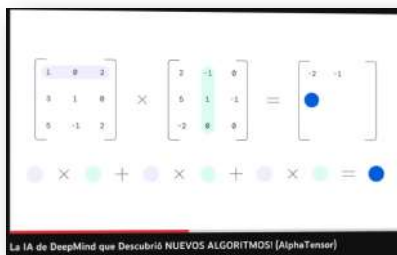
	Industries									
	Automotive and Vehicle Manufacturing	Media	Architecture and Engineering	Energy and Utilities	Healthcare Providers	Electronic Product Manufacturing	Manufacturing	Pharmaceutical		
Drug Design					•			•		
Material Science	•				•					
Chip Design								•		
Synthetic Data	•		•	•	•	•	•	•		
Generative Design (Parts)	•		•					•		

gartner.com

Source: Gartner  
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**Gartner**

# Not just Teaching: also, Research



New algorithms



Medical treatment



Data analysis



Discovery of new drugs

# Not just Teaching: also, Learning



D. Attending Lectures

E. Independent Study

F. Collaborative Study



# Summary: Not just Teaching



What to teach



For research



For learning



# 3. Beware!



## Still Many Open Issues

- Sovereignty
- Dependence
- Privacy
- Regulation
- Intellectual property
- Hallucinations
- Quality of results
- Biases
- Impact





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