AI for Effective Development of Computational Thinking

Background

What are the current capabilities of AI?

- Writing email
- Paraphrasing
- Project support
- Summarize
- Reduces plagiarism
- Playing games
- Analysis and pattern
- Prediction
- Find solutions to problems
- Unique solutions for a problem
- Content creation in different format- ppt, image, video, animation

What are you currently using AI for?

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Constructivism and Project-based learning (refresh)

Constructivism: philosophy based assumption that knowledge cannot exist outside our minds. Knowledge cannot be given from one mind to another.

New knowledge is 'constructed' or created from within individuals through experience.

Constructivism and Project-based learning

Project-based learning (PBL) is a pedagogical approach that is rooted in the theory of **constructivism.**

What is PBL?

PBL is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects.

How does PBL differ from "doing a project"? (Refresh)

Aspect	PBL	Doing a project
Timing 🕰️	The project is the learning process	The project comes after the content is taught
Purpose 💭	To learn through inquiry and creation	To show what was learned (often a summary or display)
Driving Question ❓	Starts with a real-world problem or open-ended question	Often based on a teacher-assigned topic
Process 🔁	Involves sustained inquiry, iteration, feedback, and reflection	Often a one-off task with limited depth
Collaboration 👬👭	Emphasizes teamwork and role-based problem solving	May be done individually or as divided group work
Assessment ✍️	Based on process, product, and reflection	Usually focused on final product only

PBL (refresh)

Real-world problem

Tangible deliverable

Timeline

Scaffold

Assessment

Reflection

Open-ended with constraints

Pre-requistites

- Chatgpt account (you can use any alternative)

- Ollama + local SLM

- VSCode

- AI Toolkit for Visual Studio Code plugin

Example project: Fourier transform visualisation:

https://tinyurl.com/2dvjvsr9

Refute problem (recap)

Refute problems + related autograder: https://tinyurl.com/4ykwtz74

https://chatgpt.com/share/68655cc8-f138-8007-9fcf-059c674db8ca

Implement any one project - use an LLM/SLM

1. Design a chatbot that does Socratic questioning for 3 computer science concepts you consider difficult

2. Automate a workflow for one aspect of Software Development Life Cycle (Team: integrate the pipeline)

3. Create an autograder for full stack project submissions of your students

4. Using P5JS, create a visualisation tool for any computer science concept

5. Build a simple software that translates strings from English to any vernacular language you know (Example: Kannada / Telugu / Tamil / Malayalam / Hindi...)

Day 5 presentation

Constructive Alignment

1. Learning Outcomes/Course outcomes
2. Pedagogical/Instructional strategies - Active Learning strategies, ICT tools, Visualizations,etc
3. Assessment - Assessment questions(Bloom's Level/Computational Thinking frameworks) and Autograders(open source/ self implemented)

Note: Support your presentation with the activity sheets

Course 1:

Topic	Learning Outcome	Active learning Strategy	Assessed(Y/N)	Autograder Assessment questions	Tools (Available)	Self designed Tools (Implemented)
X	LO1	TPS	N	-		-
Y	LO2	Peer Instruction	Y	Replit	Mentimeter	Visualization

Course 2:

Topic	Learning Outcome	Active learning Strategy	Assessed(Y/N)	Autograder and Assessment questions	Tools (Available)	Self designed Tools (Implemented)
X	LO1	Flipped Classroom	Y	Replit	XXX	ZZZ
Y	LO2	Pair Programming	Y	Nbgrader	Mentimeter	Visualization