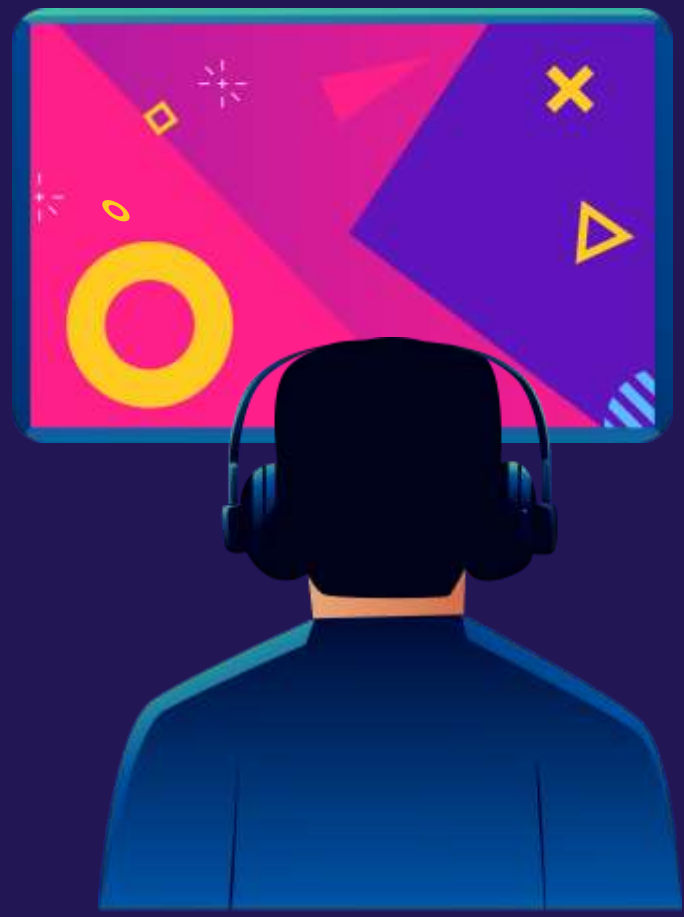
Game Design

Cognitive load theory

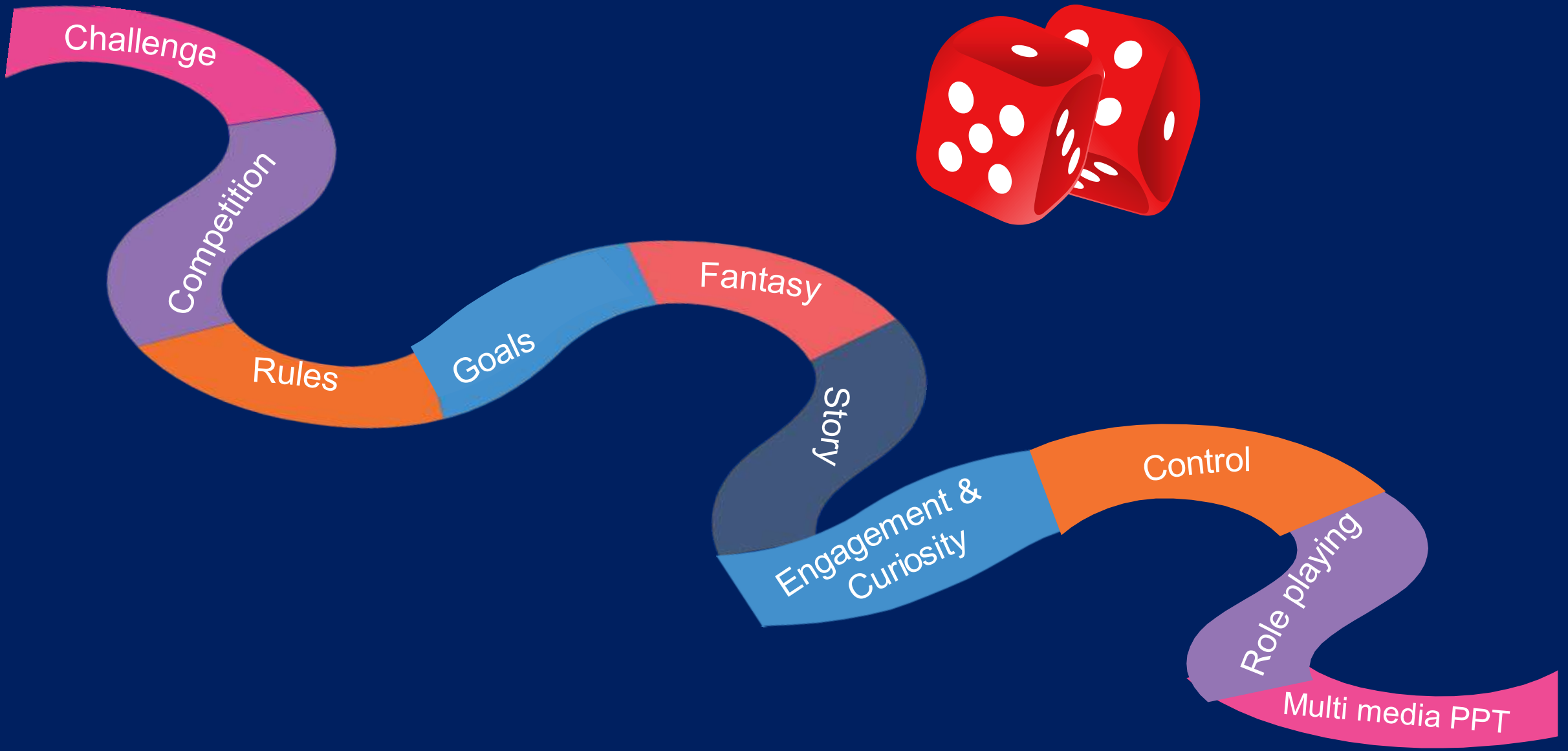
Introduction

What is the game?

A game is an activity where players compete individually or in teams to achieve specific objectives while following rules and principles. Game playing involves a series of decision-making processes and requires players to continuously try out new strategies until they achieve the game's objectives.



Games characteristic



Cognitive Load Theory

Cognitive Load Theory explains that memory has a limited capacity and that overloading it reduces the effectiveness of learning

Intrinsic load

The complexity of new information.

Germane load

Link new information with current information.

Extraneous load

Unnecessarily and distracting information.

4 components of instructional design

1. **The learning tasks**
2. **Supportive information**
3. **Part-task**
4. **JIT information**

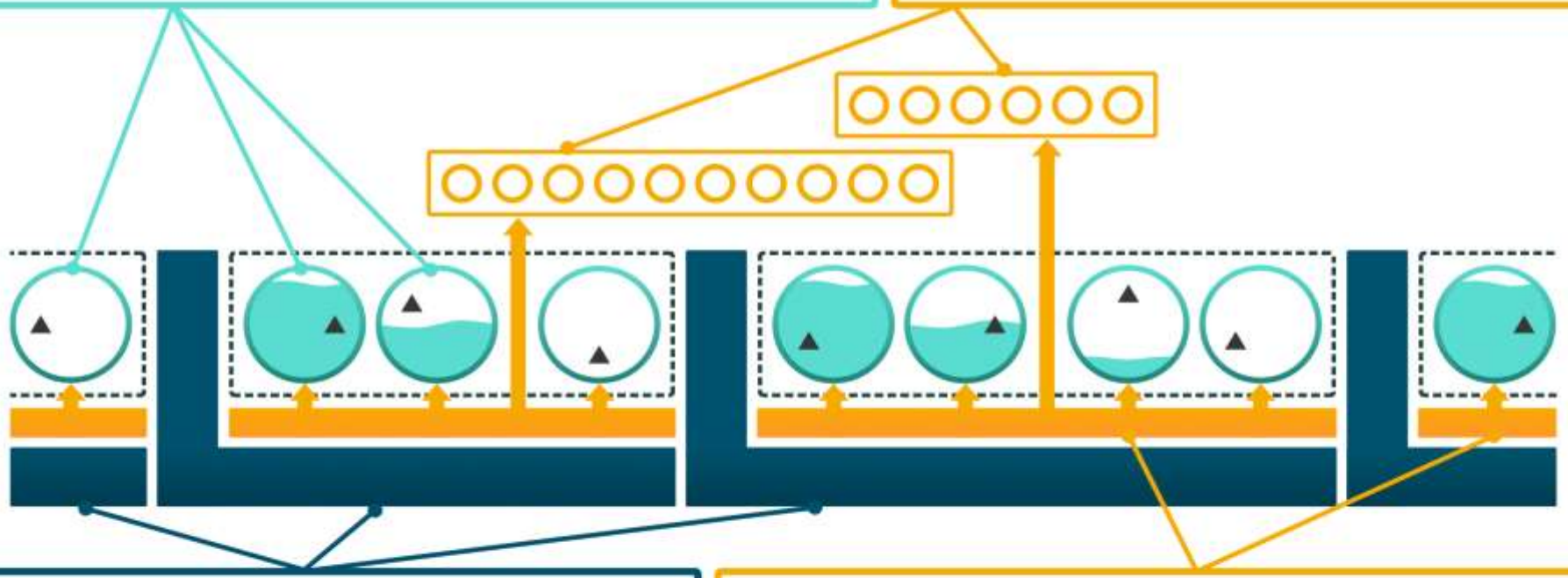
JUST IN TIME.

Learning Tasks

- Aim at integration of (non-routine and routine) skills, knowledge, and attitudes
- Provide authentic, whole-task experiences based on real-life tasks
- Are organized in simple-to-complex task classes and have diminishing support in each task class (scaffolding)
- Show high variability of practice

Part-task Practice

- Provides additional practice for selected routine aspects to reach a very high level of automaticity
- Provides a huge amount of repetition
- Only starts after the routine aspect has been introduced in the context of the whole task



Supportive Information

- Supports the learning and performance of non-routine aspects of learning tasks
- Explains how to approach problems in a domain (cognitive strategies) and how this domain is organized (mental models)

Is specified per task class and always available

Procedural Information

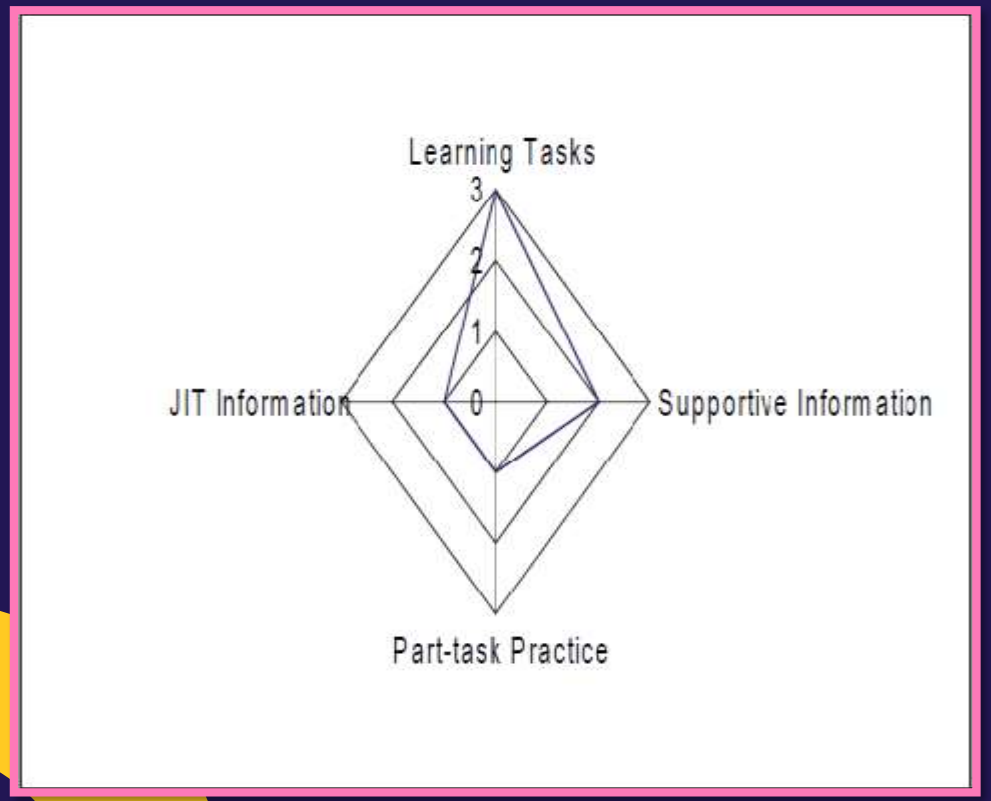
- Is prerequisite to the learning and performance of routine aspects of learning tasks
- Precisely specifies how to perform routine aspects of the task, e.g., through step-by-step instruction
- Is presented just in time during work on the learning tasks and quickly fades away as learners acquire more expertise

Example

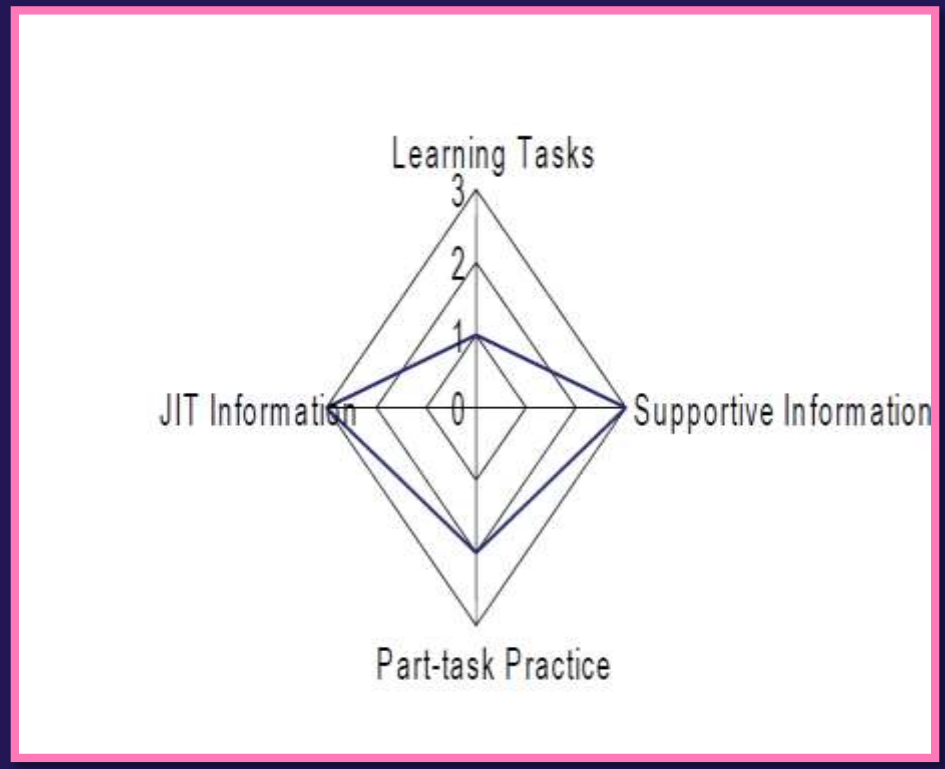

CWTL MATHS
BOARD GAME
GAME OVERVIEW


can't wait to
LEARN
LebanonMaths 1-3

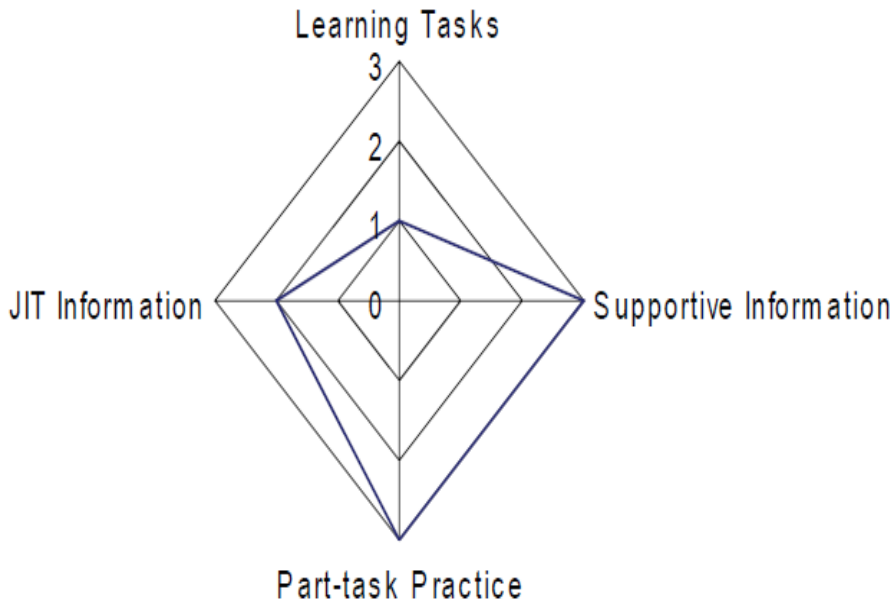
1. Design emphasis for the challenge



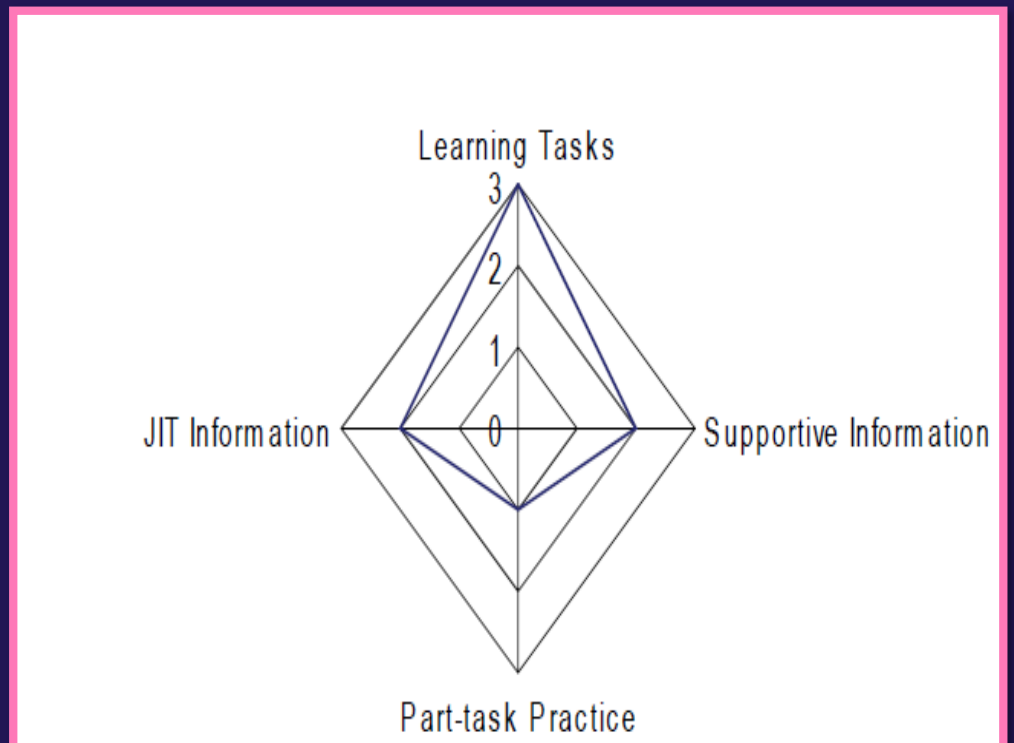
2. Design emphasis for the competition



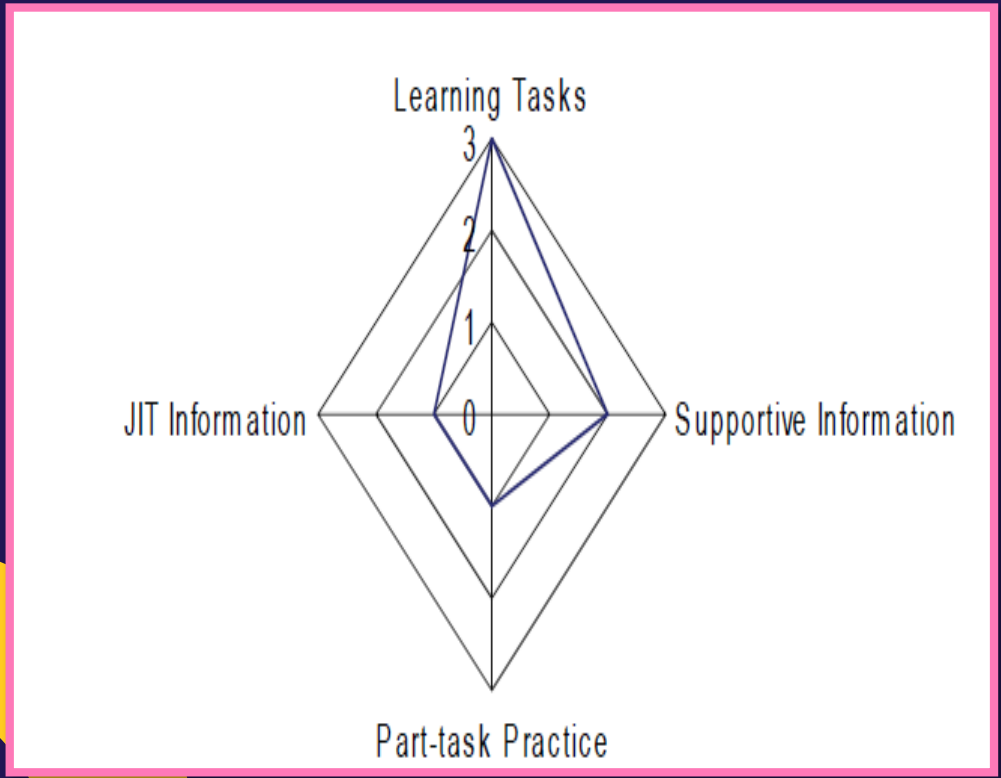
3. Design emphasis for rules



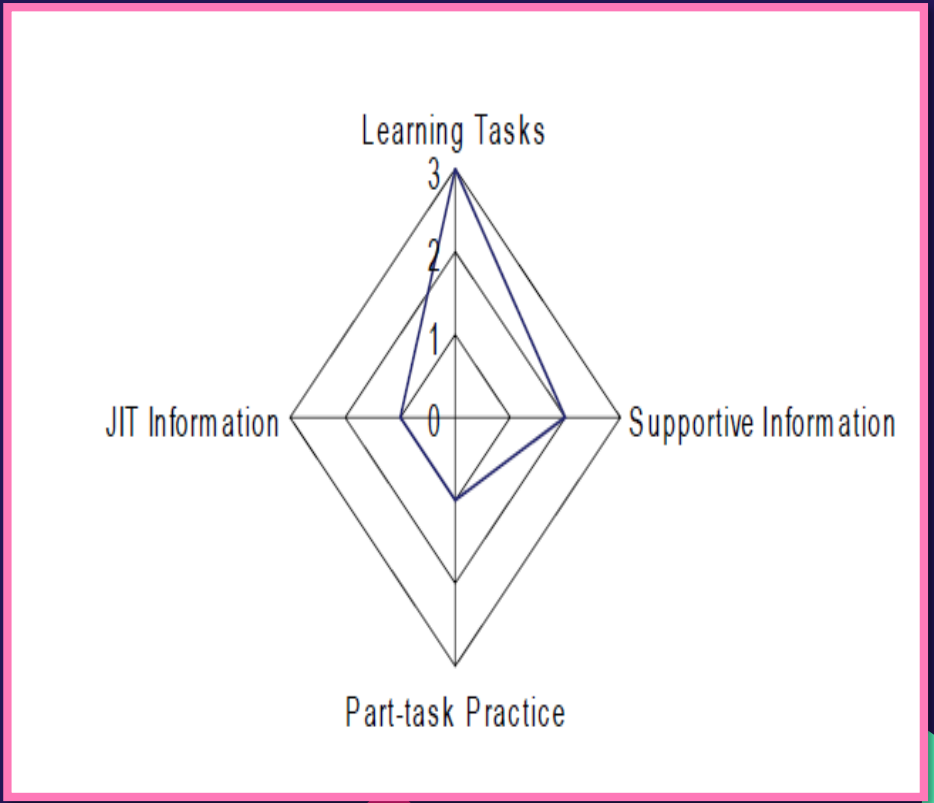
4. Design emphasis for goals



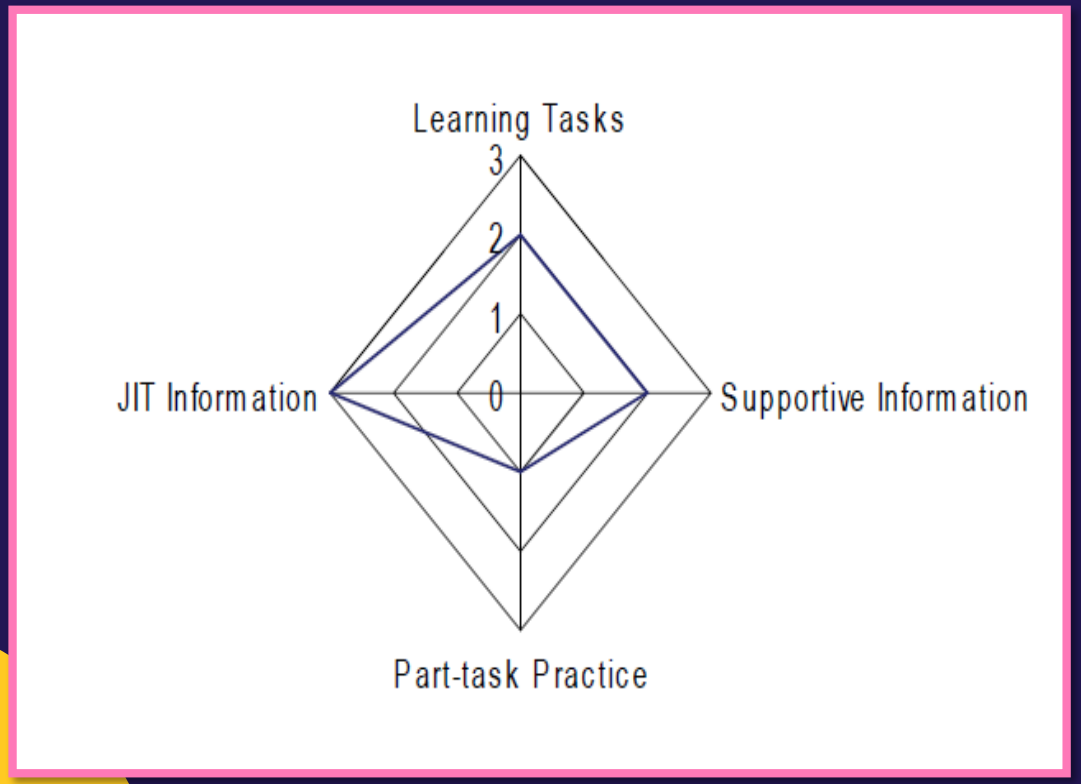
5. Design emphasis for fantasy, changed reality, and role-playing



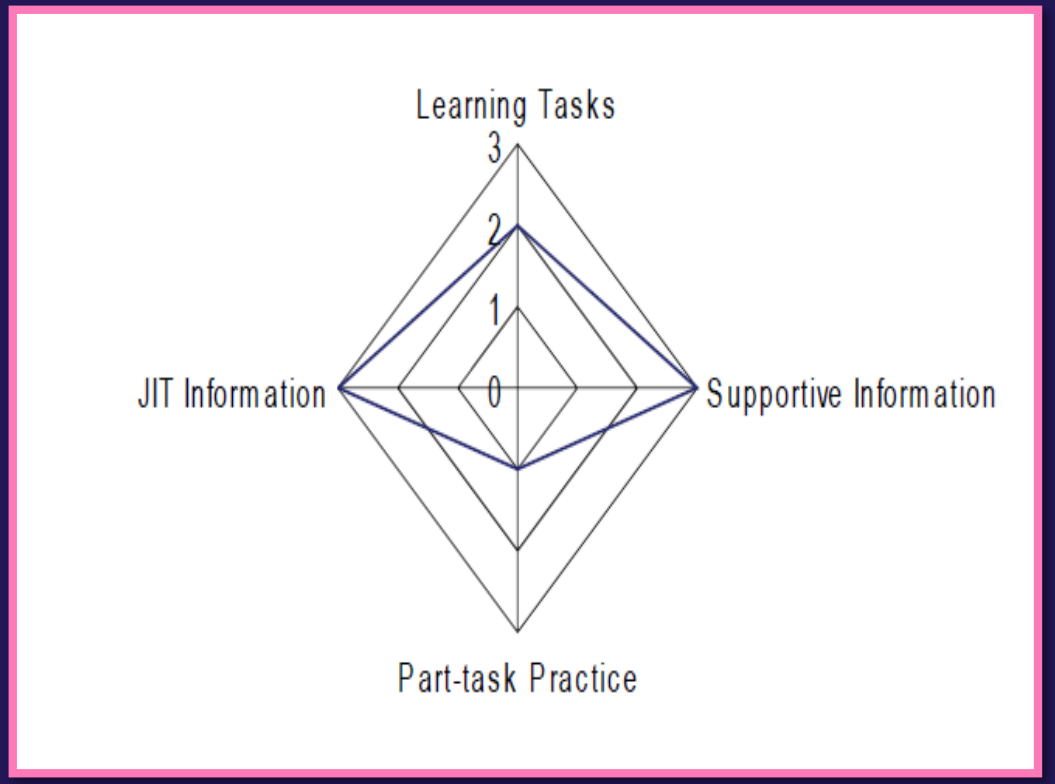
6. Design emphasis for story or representation



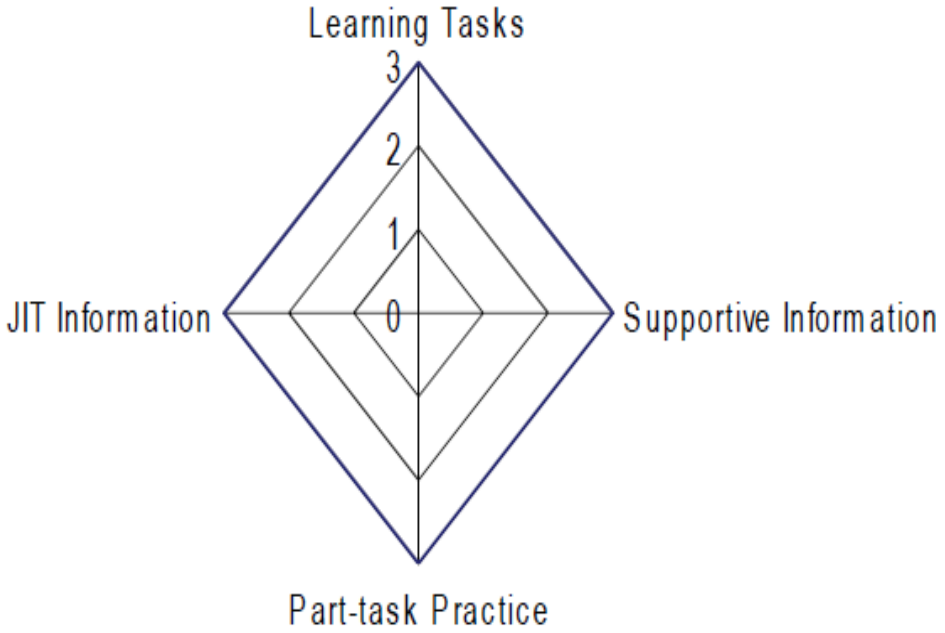
7. Design emphasis for engagement and curiosity



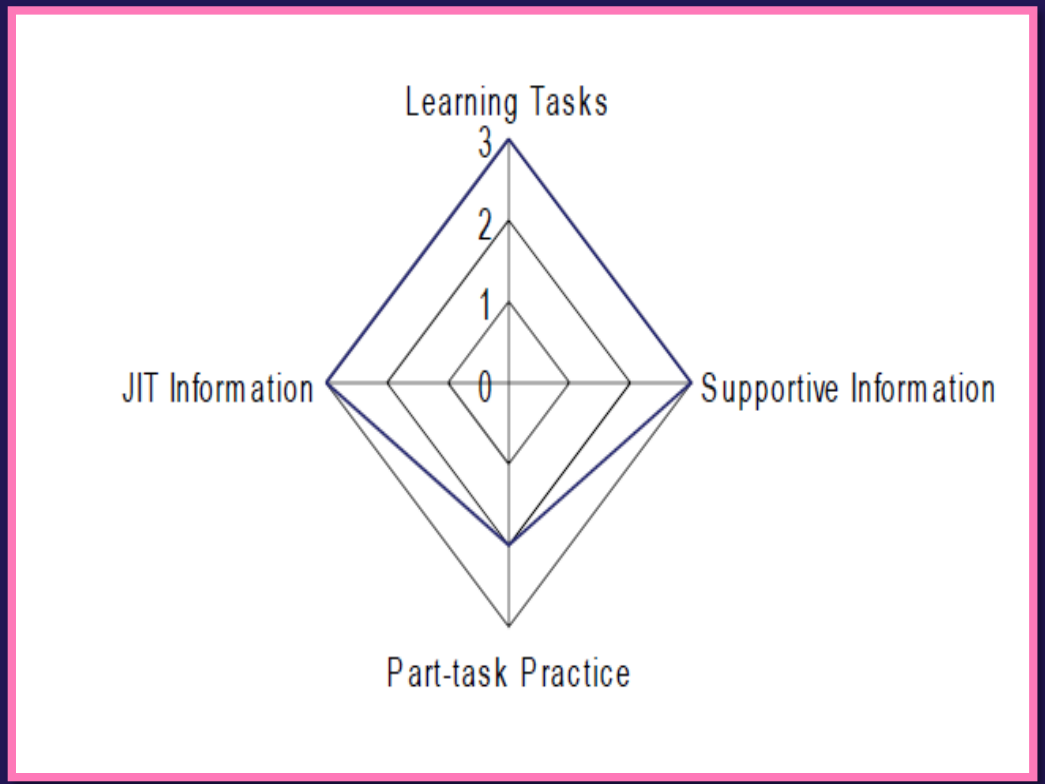
8. Design emphasis for control



9. Design emphasis for multimodal presentation



10. Design emphasis for tasks



Conclusion

1. The game design guideline for tasks highlights the importance of aligning the learning task with the game task to enable simultaneous learning and gameplay.

2. The adoption of the 4C/ID model provides opportunities for designing effective games and highlights the need for ongoing design research. In the future, it is likely to see a more streamlined design process with collaboration between computer science, learning technologies, and the game industry.

3. Research on the impact of instructional games on learning and performance is expected to include all aspects of learning, blended methodologies, and human performance improvement.