

Lesson Plan #4

Application of AI in Games and Puzzles



SAINT

HANDS ON INTRODUCTION TO ARTIFICIAL
INTELLIGENCE IN PRIMARY EDUCATION
USING MINECRAFT

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REVISION HISTORY

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REFERENCED DOCUMENTS

ID	Reference		Title
1	2022-1-FR01-KA220-SCH-000087794		SAINT Proposal
2			

APPLICABLE DOCUMENTS

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Lesson Plan: Application of AI in Games and Puzzles

Grade Level: Primary (Ages 9-12)

Subject: Computer Science / Technology

Learning Goals:

1. Understand the foundational principles of AI and its application in games and puzzles, including aspects of problem-solving, rules, and interaction.
2. Explore the societal implications of AI in games and puzzles, studying case studies and success stories.
3. Apply acquired AI knowledge in practical settings, such as the Minecraft environment.

Session 1: Understanding AI, Problem-Solving, and Rules in Games and Puzzles (45 minutes)

Objective:

- Students will understand the concept of AI, how it solves problems, and follows rules in games and puzzles.

Activities:

1. Introduction (5 minutes):

- Start the session by explaining what Artificial Intelligence (AI) is and how it is used in games and puzzles. Use simple examples like a chess-playing computer or a game bot in an online game to illustrate the idea.
- Emphasize that AI in games is not about creating systems that think like humans, but rather about creating systems that can perform tasks that would normally require human intelligence, such as solving puzzles or playing games.

2. Discussion: Problem-Solving and Rules (10 minutes):

- Start by discussing how humans solve problems and follow rules in games and puzzles. Use simple examples like solving a Sudoku puzzle or following the rules in a game of chess.
- Next, introduce the concept of AI in games, explaining that it uses algorithms to solve problems and follow rules. For example, a chess-playing AI uses a tree search algorithm to decide its next move.
- Transition into how AI uses these algorithms to make decisions based on the rules of the game or puzzle.

3. **Minecraft Activity (25 minutes):**

- First, instruct students to build a game model in Minecraft. Each model should have different blocks representing different rules - for example, a lava block could represent a barrier or obstacle, while a gold block could represent a goal or prize.
- Encourage students to be creative and think about the functionality of each rule in a game context. After completion, each group should explain their game model and how each "rule" contributes to the game's structure.
- Next, guide students to create a simple AI in Minecraft using Redstone and command blocks. This AI will represent a self-operating trap or puzzle that activates when it detects a player and deactivates when the player leaves. This activity introduces students to the concept of AI making decisions based on rules.

4. **Wrap-up (5 minutes):**

- Conclude the session by summarizing the main points from the discussion and the Minecraft activity.
- Reiterate the importance of problem-solving and rules in AI and how AI uses algorithms to make decisions.
- Preview the topics for the next session, which will delve deeper into the interaction process in AI, including the concepts of player modelling and adaptive gameplay.

Materials Needed:

- Minecraft Education Edition
- Computers with internet access

Session 2: Player Interaction, Adaptive Gameplay, and Societal Impact of AI in Games and Puzzles (45 minutes)

Objective:

- Students will understand how AI interacts with players, adapts gameplay, and its societal impact.

Activities:

1. Discussion: Player Interaction, Adaptive Gameplay, and Societal Impact (15 minutes):

- Begin with a review of player interaction, explaining how AI can interact with players in a game, react to their actions, and even predict their moves.
- Introduce the concept of adaptive gameplay in AI, describing how AI systems are designed to change the difficulty or style of gameplay based on the player's ability or behaviour.
- Discuss the societal impact of AI in games, touching on both positive and negative implications. Discuss how AI can enhance entertainment and accessibility but also raise concerns about addiction and social isolation.
- Facilitate a conversation about the ethical considerations of AI use in games, emphasizing the importance of responsible AI integration into society.

2. Minecraft Activity: Adaptive Gameplay (15 minutes):

- Instruct students to create an environment within Minecraft that adapts to the player's actions. This could be a series of traps that become more challenging as the player progresses, or a puzzle that changes based on the player's previous solutions.
- Explain that this activity is an exploration of adaptive gameplay, a key aspect of AI in games.

3. Offline Activity: Player Interaction (10 minutes):

- Ask students to imagine they are designing their own 'AI opponent' for a game and brainstorm how this AI would interact with the player.
- Students then create a 'gameplay scenario' between them and their imagined AI opponent, writing down how they would play and how they expect the AI to respond.
- Encourage students to role-play this scenario, one playing the user and the other the AI opponent, to gain a better understanding of player interaction in AI.

4. Group Activity: Societal Impact (5 minutes):

- Divide students into small groups and have each group brainstorm both benefits and drawbacks of AI in games.
- Ideas could range from enhanced entertainment and personalized gameplay to addiction risks and social isolation.
- Each group shares their thoughts with the class, promoting a balanced discussion about the societal impact of AI in games.

5. Wrap-up (5 minutes):

- Review the key concepts from the session, including how AI interacts with players, adapts gameplay, and its potential societal impact.
- Reinforce the importance of these concepts in understanding the role and potential of AI in games.
- Encourage students to think about how these concepts might apply to real-world examples of AI they encounter in their daily lives.

Materials Needed:

- Minecraft Education Edition
- Computers with internet access
- Paper and pencils

Session 3: Case Studies and Practical Application of AI in Games and Puzzles (45 minutes)

Objective:

- Students will explore real-world applications of AI in games and apply learned concepts.

Activities:

1. Guest Speaker or Case Study Discussion (15 minutes):

- Introduction: Briefly introduce the guest speaker or the case study to be discussed.
- Presentation: The guest speaker shares their experiences and applications of AI in games, or the teacher presents a case study showcasing real-world application of AI in games and puzzles.
- Discussion: Facilitate a discussion where students can ask questions to the guest speaker or share their thoughts about the case study. Encourage them to link the real-world applications to the concepts they've learned in the course.

2. Minecraft Activity #1: Real-world Application (15 minutes):

- Explanation: Briefly explain the task. Students will recreate or represent an aspect of the real-world application of AI they learned from the guest speaker or the case study.
- Activity: Students work individually or in small groups to create their Minecraft models. They can recreate a particular game AI or represent a scene where the AI is applied in a game.
- Sharing: Students share their models with the class, explaining what they've created and how it represents the real-world application of AI in games.

3. Minecraft Activity #2: AI Application in Minecraft Environment (10 minutes):

- Instruction: Guide students to apply the concepts they've learned about AI in games by creating a complex AI behaviour within the Minecraft environment. This could involve creating a system using Redstone and command blocks.
- Activity: Students work on their Minecraft projects, trying to incorporate as many learned concepts as possible.
- Discussion: Have students explain their projects to the class, focusing on the AI concepts they've used.

4. Wrap-up and Unit Reflection (5 minutes):

- Recap: Summarize the main points from the session, particularly the real-world applications of AI in games.
- Reflection: Ask students to reflect on what they've learned about AI in games throughout the course. This could be done verbally or in writing.

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- Future Consideration: Encourage students to think about how they could apply these concepts in their own lives, and what they think the future of AI in games might look like.

Materials Needed:

- Guest speaker (in-person or virtually)
- Computers with Minecraft and Internet access
- Supplies for presentations (poster board, markers, etc.)