

I. Introduction to CritiQuiz

- **Purpose:** CritiQuiz is an innovative educational information service that administers assessments tailored to meet the developmental needs of middle schoolers by focusing on the development of critical thinking skills.
- **Target Audience:** Crafted specifically for middle school students to address the cognitive shift they undergo.
- **Developmental Focus:**
 - Middle school marks a critical period for developing higher-order thinking skills as students transition from concrete to abstract thinking (Kuhn, 1999).
 - CritiQuiz capitalizes on students' readiness for complex problem-solving, reasoning, and analysis, moving beyond simple memorization.

II. Supporting Middle School Learning Transitions

- **Shift in Learning Expectations:**
 - Middle schoolers transition from guided instruction in elementary school to more self-directed and independent learning.
- **Role of CritiQuiz:**
 - Acts as a virtual tutor, guiding students through quizzes and exams in a conversational, supportive format.
 - Encourages students to think deeply, ask questions, and explore perspectives in a non-intimidating way.
- **Features for Encouragement and Support:**
 - The AI assistant offers hints, guiding questions, and immediate feedback.
 - This scaffolded support system helps students feel empowered rather than discouraged, fostering resilience and a growth mindset essential for lifelong learning.

III. Interactive, Adaptive Nature of CritiQuiz

- **Engagement with Core Middle School Subjects:**
 - CritiQuiz is well-suited for subjects like science, history, and language arts, where conceptual understanding is crucial.
 - Moves beyond mere recall to ask students to analyze, reason, and interpret.
- **Encouraging Deeper Cognitive Engagement:**

- Through discovery learning (Martaida et al., 2017), CritiQuiz prompts students to explore cause-and-effect relationships, historical contexts, scientific processes, and literary themes.
- By guiding students to connect ideas with broader concepts, CritiQuiz nurtures deeper cognitive engagement and better prepares them for advanced studies.

IV. Teacher Support and Real-Time Monitoring

- **Customizable Assessment Tools:**
 - Teachers can design quizzes aligned with curriculum goals and choose question types that match middle schoolers' skill levels.
 - Content can be adjusted to each student's unique needs, supporting individual learning journeys.
- **Insightful Reporting for Tailored Instruction:**
 - CritiQuiz's reporting features reveal individual strengths, weaknesses, and patterns in responses.
 - Teachers can identify areas for additional support, such as open-ended analytical questions, and offer targeted resources or practice.

V. Setting Up Information Needs in CritiQuiz

- **Teacher Form for AI Model Instructions:**
 - Teachers configure the AI model with specific instructions, ensuring it aligns with their assessment goals.
 - **Form Components:**
 1. **Test Difficulty:** Set the difficulty level (easy, medium, hard) to tailor the AI's feedback and hints.
 2. **Determinism Setting:** Adjust model behavior from "strict" (consistent) to "flexible" (adaptive) responses.
 3. **Instructions for Students:** Provide guidance or specific messages the AI will convey to students.
 4. **Glossary of Terms:** Add key terms relevant to the assessment to support student understanding.
 5. **Number of Attempts per Question:** Define the allowed number of attempts, influencing feedback style.
 6. **Additional Settings:** Customize feedback tone or response detail to match the assessment style.
 - **Outcome:** The form configures the AI model, helping it provide personalized, supportive responses.

- **Building an Assessment in CritiQuiz:**
 - **Assessment Creation Steps:**
 1. **Create a New Assessment:** Start a new assessment with a title and subject.
 2. **Input Question Bank:** Add questions, answer keys, difficulty levels, and topic tags.
 3. **Set Answer Key:** Define correct answers and explanations for each question.
 4. **Configure Hints and Feedback:** Add hints and specify feedback options based on student responses.
 - **Outcome:** Prepares the AI with structured questions and answers, enabling tailored responses and feedback.
- **Assigning the Assessment to Courses and User Groups:**
 - **Assignment Steps:**
 1. **Select Course:** Link the assessment to a relevant subject or class for easy organization.
 2. **Define User (Student) Group:** Assign the assessment to specific student groups (grade, classroom section).
 3. **Set Assessment Expiration Date:** Establish an expiration to manage scheduling and encourage timely completion.
 4. **Specify Duration:** Set a time limit to track time management and provide feedback on pacing.
 - **Outcome:** Ensures that the assessment reaches the right students and is accessible within a set timeframe, supporting effective assessment management.

AI Model Analysis of Student Responses and Report Generation

- **Analyzing Student Responses:**
 - The AI model evaluates each student's answers in real time, checking for correctness, clarity, and logical structure.
 - **Components of Analysis:**
 - **Accuracy Check:** Compares student answers against the answer key to determine correctness.
 - **Response Pattern Analysis:** Identifies common mistakes or misconceptions based on repeated errors.
 - **Use of Hints and Attempts:** Monitors how often students use hints or multiple attempts, offering insights into question difficulty and student confidence.

- **Depth of Reasoning:** For open-ended questions, the model evaluates the quality of reasoning and explanation provided by the student.
 - **Adaptive Feedback Generation:**
 - Based on the analysis, the AI provides tailored feedback to guide the student, such as explanations for incorrect answers, tips for improvement, or praise for well-constructed answers.
- **Generating Reports for Teachers:**
 - **Components of the Report:**
 - **Performance Overview:** Summarizes scores, question accuracy, and use of hints for each student.
 - **Strengths and Weaknesses:** Highlights specific areas where the student excels or struggles, such as particular topics or types of questions.
 - **Progress Tracking:** Provides data on how the student has improved over time, based on previous assessments.
 - **Metacognitive Insights:** Reflects on student engagement with hints, attempts, and feedback, offering teachers insights into each student's approach to learning.
 - **Group Performance Metrics:** Allows teachers to compare individual student performance within a class or group, identifying broader trends and common challenges.
 - **Report Accessibility:**
 - Reports are stored in the system and accessible to teachers in real time for monitoring progress.
 - Teachers can view summary dashboards or detailed reports for individual students.
- **Outcome:**
 - This analysis and reporting process gives teachers valuable insights into student performance and areas for targeted instruction, supporting personalized learning and continuous improvement.

VII. Fostering Metacognitive Skills in Students

- **Value of Instant, Reflective Feedback:**
 - CritiQuiz explains not only the correct answers but also the reasoning behind them.
 - This feedback fosters metacognitive skills, helping students think about and evaluate their own understanding (Kuhn, 1999).
- **Importance of Middle School for Developing Metacognition:**

- CritiQuiz encourages students to reflect on their answers, recognize gaps in knowledge, and develop improvement strategies.
- This reflection builds self-awareness, encouraging students to approach learning independently and with confidence.

VIII. Preparation for Standardized Tests and Academic Challenges

- **Developing Higher-Order Thinking Skills:**
 - CritiQuiz emphasizes critical thinking skills such as analyzing, evaluating, and synthesizing information.
 - These skills lay a strong foundation for academic success and real-world problem-solving across disciplines.
- **Enhanced Test-Taking and Problem-Solving Skills:**
 - Through practice in CritiQuiz's feedback loops, students improve test-taking strategies while building cognitive tools essential for handling real-life challenges with curiosity and confidence.

IX. Conclusion

- **CritiQuiz's Impact on Student Growth:**
 - A powerful resource during a pivotal developmental stage, CritiQuiz fosters critical thinking, resilience, and independence.
 - Provides students with the skills to be reflective, analytical, and resilient thinkers.
 - Equips middle schoolers with a foundational skill set that will benefit them in academics and life, preparing them for a lifetime of thoughtful learning and problem-solving.