### **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.