# Chapter 13
# AI for Formative and Summative Assessment:
## A Balanced Approach

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## ABSTRACT

*Artificial Intelligence (AI) is significantly reshaping educational assessment, offering useful tools to enhance both formative and summative practices. This chapter explores how AI can alter and improve assessment by providing personalized, real-time feedback and adaptive learning experiences for formative evaluation, while improving the efficiency, consistency, and scalability of summative assessments through automated grading and AI-driven rubrics. The integration of AI promises substantial benefits, including time-saving measures for educators, enhanced personalization, and data-driven insights. However, it also introduces critical challenges that necessitate a redesign of assessment practices. Ethical considerations such as algorithmic bias, the need for human oversight, data privacy, the importance of the teacher-student relationship, and equitable access must be carefully addressed. This chapter advocates for a balanced approach, emphasizing the synergistic potential of AI to augment human expertise and foster ethical, effective, and equitable assessment.*

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## BRIEF GLOSSARY OF TERMS

To aid in your reading of this chapter, consider these key terms you will encounter.

- **Adaptive Learning Systems:** AI-powered educational platforms that dynamically adjust the presentation of content and learning pathways in real-time based on an individual student's performance and needs.
- **Algorithmic Bias:** Systematic and repeatable errors in an AI system that create unfair outcomes, such as disadvantaging certain groups of students, often stemming from biased training data or flawed algorithm design.
- **Artificial Intelligence (AI):** Technology that enables computer systems to perform tasks typically requiring human intelligence, such as learning, problem-solving, and decision-making, applied here to enhance educational assessment.
- **Automated Grading:** The use of AI systems, particularly Natural Language Processing, to evaluate and score student work, such as essays or short answers, based on predefined criteria.
- **Data Privacy:** The protection of sensitive student information collected and processed by AI assessment tools, ensuring confidentiality and compliance with ethical and legal standards.
- **Formative Assessment:** Ongoing assessment processes during instruction designed to monitor student learning and provide immediate, actionable feedback to improve teaching and learning.
- **Item Response Theory (IRT):** A psychometric model used in AI-powered adaptive testing to estimate a student's ability level based on their responses to assessment items of varying difficulty and characteristics.
- **Knowledge Tracing:** An AI technique that models a student's understanding of specific concepts over time by analyzing their interactions with learning materials and assessments to predict performance.
- **Natural Language Processing (NLP):** A branch of AI that enables computers to understand, interpret, and generate human language, used in assessment for tasks like automated essay scoring and feedback generation.
- **Personalized Feedback:** Tailored comments and guidance provided to students, often by AI systems, based on their specific responses and learning patterns to support individual improvement.
- **Summative Assessment:** Evaluation conducted at the end of an instructional period (e.g., unit, course) to measure overall student achievement and assign grades.