

Chapter 10

Applications of Artificial Intelligence in Assessment for Learning in Schools

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ABSTRACT

Assessment for Learning (AfL) is a process in measuring the learning outcome in students. Current practices in assessing the academic performance of students in most of the countries are still manual. It is based on the qualitative and quantitative feedbacks, obtained by expressed statement and marks, respectively. The issues associated with such assessment-practices are that it (a) lacks autonomy in students and the teachers to assess themselves for (1) better learning (ABeL) and (2) to learning (AtoL) with greater accuracy; (b) Self, peer and parents' involvements in the assessment process has often been underestimated, and (c) involved human bias while giving the qualitative and quantitative feedbacks. Given the background, this chapter attempts to showcase how various Artificial Intelligence (AI)-based solutions, such as Expert Control System (ECS)-based tutoring platform and Agent-based tutoring systems (AbS) can be used for the AfL, which in turn, improve ABeL and AtoL in students.

INTRODUCTION

Assessment for learning (AfL) has been conceived as a series of formative assessments in contrast to summative assessment, which is conducted at one time (i.e., the final assessment) at the end of a teaching session. Michael Scriven coined the terms formative and summative assessments in 1967 to distinguish and explain the roles of evaluation processes during and after the academic session, respectively (Tyler, Gagne & Scriven, 1967). Benjamin Bloom and colleagues in 1971 suggested applying the same

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distinction to evaluate student learning, which in today's education world is called as the 'assessment' (Bloom, Hastings, & Madaus, 1971; William, 2006). The role of summative assessment is just summing the achievement of students/learners after the end of the academic session (Bloom, Hastings, & Madaus, 1971; National Research Council [NRC], 2001; Sadler, 1989; Shavelson, 2006). Formative assessment enhances learning through giving active feedback to the students while the teaching still in process (Black & Wiliam, 1998a, 1998b; Black & Wiliam, 2003; Black & Wiliam, 2004; Black, Harrison, Lee, Marshal, & William, 2004; Sadler, 1989; Shavelson, 2006). Summative assessment is also referred to as Assessment of Learning (AoL), whereas formative assessment is termed as the AfL (Black & Wiliam, 2003; Broadfoot, 2008; Gipps & Stobart, 1997; Stiggins, 2002). It is important to mention here, that, Black and William's (2004) research came up with three major findings on the overall assessment processes. These are as follows:

1. *Benefits of implementation of AfL:*
 - An AfL could be implemented effectively,
 - It raises standards of achievement across the board including the low achievers,
 - It could reduce the spread of attainment while raising the standards of achievement, and
 - Students could be given quality support and constructive feedback, to make learning more effective.
2. *Common hindrances in the development of AfL in schools:*
 - Over-reliance on paper-based or oral-based subject competence testing,
 - Its negative impact on students while grading,
 - Comparing students with one another and creating a too much competitive environment, which might lead to jealousy and
 - Too much focus on the managerial role of assessments, paper works etc. and losing the focus on the learning.

Based on these two observations, Black and William's (2004) had *proposed* that,

3. Schools can use to develop their own assessment procedures by looking at best practices by leading schools. To propagate the philosophy further, The King's College (Black and William, 1998a, 1998b) developed several key strategies to support AfL by taking up the following actions:
 - Facilitating students' learning through discussions and questioning,
 - Teachers giving feedbacks to help achieving the goals of the students,
 - Peer learning and assessment to enhance the process of learning,
 - Making self-assessment and peer-based assessment as key components of learning, and
 - Enabling students to take ownership of their learning.

Practically there are still huge variations in the process of conceptualization and implementation of formative assessment. To address this issue, researchers have realized that regular testing and informing students of their scores do not constitute formative assessment; instead, the evidence of students' understanding, evoked from the formative assessment process should be used to adapt the lesson plan and delivery to meet the learning needs of the students (Black, Harrison, Lee, Marshal, & William, 2004). In 2007, Formative Assessment for Students and Teachers State Collaborative (FAST SCASS) identified five attributes of the formative assessment process from the available literature, which are as follows:

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