Reflection Report

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1. CBC, CBE, and CBA as a System

In a competency-based education system, three key elements work together: CBC, CBE, and CBA. CBC defines specific learning objectives while focusing on practical skills that learners can apply in real life. CBE allows learners to study at their own pace by actively exploring and solving real-world problems. CBA measures learners' abilities through practical tasks such as presentations and projects. CBC, CBE, and CBA create an interconnected system that implements clear goals, active participation, and a broad assessment of skills to achieve successful outcomes. These three components prepare learners not only for exams but also for life after school, fostering confidence, independence, and the ability to apply knowledge in everyday and professional situations. Therefore, competency-based teaching holds practical significance. The PD course program titled "Innovations and Modern Technologies in Teaching Chemistry" was conducted. During the course, I clearly understood what and how I would assess: solving creative tasks, designing lesson fragments with learning tasks, and the ability to work in a team. The course program was focused on developing the essential competencies needed for an effective educational process, including creatively solving tasks and designing lessons. As a result, the learning process became more effective, personalized, and practical. CBC, CBE, and CBA are competency-based communications. This ensures the alignment between what learners will learn, how they will do it, and how they will be assessed.

2. Curriculum Development and Learning Goals

In the context of CBC, quality learning objectives, learning activities, and assessments should be integrated in ways that promote the development of students' core competencies. Learning objectives must be specific and measurable according to SMART criteria, while learning activities should aim to enhance skills and apply knowledge in practice to deepen understanding. I developed a lesson plan for a chemistry class focused on investigating the physical and chemical properties of sulfuric acid solution. This lesson was conducted by a chemistry teacher, and I observed it. Lesson Objectives: 1. Identify three physical properties of sulfuric acid solution (color, odor, density); 2. Investigate the chemical properties of the solution through reactions with sodium and calcium carbonate. The lesson began with a discussion of the theoretical aspects of sulfuric acid. Students were divided into groups to conduct experiments. Each group performed experiments to determine the properties of the solution and recorded the results in a table. Students' participation in conducting the chemical experiment, as well as observing chemical reactions and discussing results within their groups, developed their communication skills. The teacher used checklists to assess group work. For example, it was possible to assess each student's participation in asking questions, proposing ideas, and discussing experimental results. Students presented their findings in the form of a presentation. The assessment included criteria such as the accuracy of data, drawing conclusions, and justifying observations. The learning objectives provided clear guidance in lesson planning, material selection, and organization of learning activities. The objectives ensured a systematic approach to teaching, leading to the achievement of outcomes for each activity. Since the learning objectives were clear and understandable for the students, they had a better grasp of what they wanted to learn and actively engaged in the learning process. For assessment, the learning objectives helped in developing competency-based assessment tools, ensuring fairness in evaluation. They demonstrated the specific skills that students needed to master. Constructive alignment integrated the three key elements of the learning process—learning objectives, learning activities, and assessment.

3. Assessment Quality: Validity, Reliability, and Fairness

The three main principles of educational testing are reliability, validity, and fairness. These principles help create assessments characterized by stability, accuracy, and inclusivity. Each of them adequately demonstrates the necessary skills of the assessment, providing learners with equal opportunities for success. Grounding the test development process in these three principles has deepened my test developing skills. I successfully constructed various types of questions that cover the topic comprehensively. However, I realized the need to improve the formulation of some questions to enhance their clarity and reduce ambiguity. After conducting

PD course for chemistry teachers, I observed a lesson of the teacher as a part of post course support. By the end of the lesson a test was administered. The students' responses demonstrated high level of comprehension. I had questions: why were the results similar? What was the reason? How reliable, valid, and fair was the test? We discussed this with the teacher. There were 15 test questions, all aligned with the learning objectives. The validity of the questions is ensured by their alignment with the learning objectives, allowing for an accurate measurement of participants' knowledge. Equal opportunities were provided to all participants. Fairness was ensured as the tasks were designed for learners at different levels. Two students were given additional time as needed. The questions were specific and clear. However, the distractors were poorly constructed. The reason is that the incorrect distractors did not align with the correct answer and were poorly thought out. Such distractors are ineffective because test-takers can easily eliminate them, and they do not pose sufficient difficulty for assessing knowledge. Providing feedback to the teacher, we reviewed the distractors. We made the distractors close to the correct answer. In the next class, a modified test was administered. Some students selected the distractors as the correct answers. This indicates that the distractors were "strong." I concluded that a deep understanding of the topic is required for students.

4. Grading and Standard Setting

Assessment is carried out through a comprehensive approach that includes both formative and summative assessment. Grades are assigned based on various testing formats, such as written exams, practical tasks, projects, and self-assessments. This allows for a complete understanding of students' knowledge and skills. The transparency of the assessment is ensured by providing students with clear criteria and guidelines in advance. Each assessment format has specific goals and objectives, enabling students to understand what is being assessed. The threshold values are established considering the minimum level of knowledge and skills required to successfully complete the educational tasks. After completing a module of the chemistry course, I employed a mixed approach to set the threshold levels for the interim test. This method combines elements of both absolute and relative approaches. The test consisted of 25 questions covering topics such as atomic structure, electronic configuration, and types of chemical bonds. The questions were aimed at assessing theoretical knowledge and practical skills. Before administering the test, I defined the range for the passing score between 14 and 17 out of 25. After the testing was completed, I reviewed the test to identify issues such as unclear questions and complex tasks. During the analysis, I noted that some questions were difficult to understand, and two questions were particularly challenging, which affected the overall results. Based on this analysis, I set the passing score at 16 out of 25. Establishing a preliminary range ensured the transparency of the assessment process, while

making adjustments allowed for consideration of the actual testing conditions. The review after the test enabled me to take into account the performance of different groups of learners. Analyzing statistics and discussing potential issues takes time, but these steps are necessary to ensure accuracy and fairness. This experience allowed me to adapt the assessment process to specific testing conditions.

5. Use of Rubrics

In developing rubrics, clarity and specificity of criteria are essential. This ensures that the assessment is objective and authentic. Rubrics teach students an important skill: analysis of their own and their peers' work. In my experience, I created a rubric for assessing a task aimed at developing students' functional literacy for a course for chemistry teachers. A contextual task on the topic of "Protecting the Ozone Layer" was proposed for this purpose. The criteria were based on the relevance of the context, scientific accuracy, and the formulation of questions. Initially, I did not present the rubric to the small group of teachers. Completing the task took a considerable amount of time. Questions such as "How exactly should we do this?" were heard in the audience. For example, some provided data on the importance of the ozone layer, which contributed to a deeper understanding of the topic. Others faced difficulties in formulating questions. At that moment, it became clear that providing the rubric in advance was important. The use of the rubric allowed me to accurately assess the teachers' work and provide them with constructive feedback. The descriptors written for each level helped overcome difficulties, understand the next steps, and enable strong groups to reach higher levels. Thus, the rubric facilitated differentiation in teaching. The rubric developed teachers' skills in successfully completing tasks, critical thinking, and analysis. Teachers were able to see which aspects of their work needed improvement. By learning to create rubrics, teachers were able to enhance the objectivity of assessment, which contributes to accurately evaluating students' work. Through the rubric, teachers were able to assess students' work and provide them with specific and constructive feedback, which helped students improve their knowledge. However, certain aspects of rubric development need improvement. For instance, some students may not correctly understand the questions of the task, so the descriptors for each level should be written in clear language.

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