Alternative Assessment in Statistics Education

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The three presentations of the Invited Paper Meeting on "Issues Involved in the Assessment and Evaluation of Student Learning of Statistics" were stimulating, relevant, and interesting. In my view, they pointed out the need of the statistical education community to critically evaluate traditional assessment methods. We are currently facing changes in assessment methods, which are transforming the education world (Gal & Garfield, 1997). I shall first outline the key elements and directions of these changes. Then from this perspective, I shall comment on the presentations.

The *alternative assessment movement* argues that traditional forms of assessment are too narrow to provide sufficient information about student learning, are not aligned with current instructional and curricular goals, and are inadequate for evaluating student understanding or promoting successful learning. The following table presents a sample of desirable transformations in statistics assessment practice (Schwartz, 1995).

Table 1. Sample of major shifts in statistics assessment practice

Away from	**Toward**
Using assessment to filter and select students out of the opportunities to learn statistics	Using assessment results to ensure that all students have the opportunity to achieve their potential
Assessing primarily students' knowledge of specific facts, procedures, and isolated skills.	Assessing students' full statistical power in a problem context: facts, skills, concepts, statistical and general strategies, appreciation, and personal attitudes
Restricting students to a single way of demonstrating statistical knowledge	Providing students multiple opportunities to demonstrate their full statistical power
Treating assessment as independent of curriculum and instruction	Aligning assessment with curriculum and instruction
Viewing students as the objects of assessment	Viewing students as active participants in the assessment process
Regarding assessment as sporadic and conclusive	Regarding assessment as continual and recursive

In addition, the definition of *assessment* has expanded beyond *testing* to emphasize newer definitions of assessment. These include procedures which are more likely to elicit complex intellectual performance than traditional paper and pencil tests. The various assessment dimensions are captured in the following diagram.

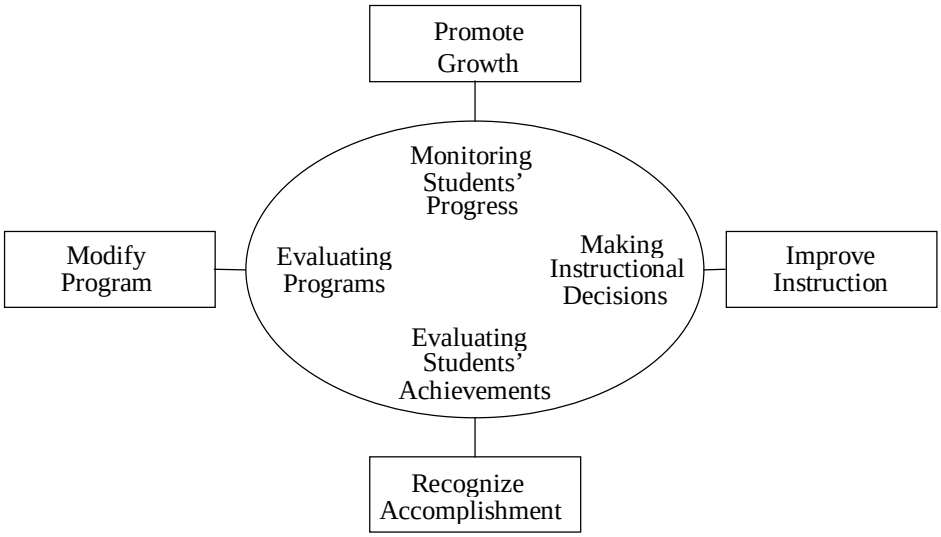

Figure 1. Multiple Dimensions of Statistics Assessment

Some of these alternative assessment procedures were exemplified in today's presentations, namely, group-work, presentations, and multiple choice in a constructive form. In addition, they may include portfolios of student work, individual or group projects, concept maps, laboratory activities, etc.

Cicchitelli and colleagues summarize a research study to investigate the impact of technology on student assessment techniques and discuss validation referring to the traditional oral examinations. However, their paper does not address the issues posed by the nature of alternative assessment.

When alternative methods are implemented, feasibility issues must be considered. Teacher readiness and time constraints are frequent obstacles to implementation. Starkings evaluates three assessment models, in terms of their usefulness, and their advantages and disadvantages in large group situations. However, more research is needed to advance our understanding of these methods' contribution to students' statistics learning, especially in collaborative learning environments. In addition, we need to further explore students' role as active participants in the assessment process.

Regarding assessment as a continual and recursive process, Chance and colleagues present an example of a dynamic educational experiment. This study combines and explores multi-dimensional assessment methods to continually assess student performance, understanding and reasoning, to evaluate and improve the effectiveness of new instructional techniques, software, activities and teaching practices, and to track students' misconceptions. However, further exploration is required to evaluate the effects of these methods on the student learning process, and to suggest a model of statistical reasoning for sampling distributions.

The different assessment methods described today may be used in combination with each other, and in combination with traditional quizzes and exams as well. Chance (1997) provides an excellent model for combining different assessment components in a computer-intensive introductory course. It consists of two in-class midterms, a final in-class and take-home exam, weekly homework assignments and presentations, weekly computer lab write-ups, quizzes, a term group project including periodic project reports, and presentations or journals.

The presentations on alternative conceptualizations of assessment, and their role in statistics education research, offer new ways to better understand and document student learning. It is important for all statistics instructors to become familiar with the new assessment concepts, procedures, and methods. Thus, they can carefully determine how to best assess student learning and evaluate the learning outcomes for their particular courses, keeping in mind that the most important role of assessment is to enhance student learning and understanding.

REFERENCES

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FRENCH RÉSUMÉ

Cet article présente les éléments "clef" des changements actuels dans les méthodes d'évaluation des statistiques d'éducation. Cette perspective est basée sur trois présentations de IPM62. Il est important pour tout instructeur de statistiques de se familiariser avec les nouveaux concepts, procédures et méthodes d'évaluation, et de se rappeler que le rôle le plus important de l'évaluation est d'encourager l'enseignement et la compréhension de l'éléve.