



Thématique

L'analyse des pratiques d'évaluations en classe.

TITRE DE LA COMMUNICATION

SOUTIEN AUX ENSEIGNANTS DANS LEUR PRATIQUE D'ÉVALUATION EN MATHÉMATIQUES : EFFETS SUR LES COMPÉTENCES DES ÉLÈVES

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Dans le cadre de deux études dans deux pays – les Pays-Bas et la Chine – nous avons étudié les effets sur l'apprentissage des élèves, d'une formation des enseignants en mathématiques sur leur pratique d'évaluation. L'échantillon de l'étude Néerlandaise était composé de 616 élèves et de 30 enseignants de CE2 ; celui en Chine était constitué de 3040 élèves et de 47 enseignants de CE2. Dans les deux pays, les enseignants étaient répartis dans des conditions expérimentales ou de contrôle. Les enseignants des conditions expérimentales participaient à des workshops sur l'utilisation de techniques d'évaluation en mathématiques. Ces techniques avaient pour but de permettre aux enseignants de découvrir les raisonnements des élèves et ainsi d'adapter leurs enseignements aux besoins des élèves. Étant donné que les deux curricula avaient des points de focalisation différents, aux Pays-Bas les techniques portaient sur le domaine des nombres, tandis qu'il s'agissait, en Chine, de la multiplication des nombres à deux chiffres. Des résultats de tests standardisés de mathématiques ont été pris en compte afin de déterminer les effets sur l'apprentissage des élèves des workshops sur les techniques d'évaluation. Aux Pays-Bas, les élèves des enseignants qui avaient participé à trois workshops d'une heure sur l'utilisation des techniques d'évaluation, s'étaient améliorés significativement plus, en terme de compétences mathématiques, que les élèves des autres conditions ($d = 0.26$). En Chine, il n'y a eu, à première vue, aucun effet sur le gain en performance des élèves (les analyses sont en cours). Les résultats de ces deux études montrent que soutenir la pratique d'évaluation des enseignants peut contribuer à l'amélioration des compétences en mathématiques des élèves. Prenant en compte les perspectives culturelles différentes, ceci nous permet de confirmer, qu'il est primordial de porter une attention particulière à la façon dont les enseignants utilisent l'évaluation dans leurs cours de mathématiques.

Mots clés : évaluation formative ; workshops ; enseignants

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Introduction

The guidance teachers provide in their mathematics classes can be more or less effective for stimulating students' learning processes, depending on whether their instruction is attuned to students' needs and possibilities for further development. In a continual striving for providing the best possible help to students, teachers need to know at practically every particular moment in their classes of every single student where they are in their understanding (Wiliam, 2011). This was recently echoed by Schoenfeld (2014) when he wrote that "[p]owerful instruction 'meets students where they are' and gives them opportunities to move forward" (p. 407). Classroom assessment, i.e. assessment in the hands of the teachers that is interwoven with instruction and integrated in daily teaching practice, can inform teachers of 'where their students are' and as such enable them to adapt their further instruction to their students' needs.

Aim and research question

We aimed to find out whether giving support to teachers on the use of classroom assessment had an effect on their students' mathematics achievement. The rationale for this is that providing professional development to teachers on the use of classroom assessment in mathematics can lead to teachers gaining more information on their students' mathematical understanding and skills. Teachers get this information through the effective use of classroom assessment, allowing them to better adapt their teaching to their students' needs, which in turn is expected to lead to improved student achievement. In our studies, classroom assessment is conceived as the use of what we call 'classroom assessment techniques' (CATs): short teacher-initiated assessment activities that teachers can use in their daily practice to reveal their students' understanding of a particular mathematical concept or skill (cf. Veldhuis & Van den Heuvel-Panhuizen, 2014). In an effort to experimentally investigate the effects on student learning of teachers using CATs, we set up two studies in two countries, the Netherlands and Nanjing, China.

Our main research question for these studies was: *What are the effects of supporting teachers'*

use of classroom assessment in mathematics on students' mathematics achievement?

Method

We investigated the main research question in an experimental study with pretest/posttest and control group design with 30 third-grade teachers in the Netherlands, and with 47 primary mathematics teachers in Nanjing, China. The interventions in the two studies were highly related but differed on several key aspects; as they were designed taking into account the respective (educational) cultures of the Netherlands and China, and various practical constraints. The aspects on which the studies differed pertain to the number of conditions, the duration of the intervention, and the content of the CATs.

In the Netherlands, there were four different conditions. Apart from a control condition, in which teachers did not partake in any professional development sessions, we had three experimental conditions in which the number of professional development sessions (one-hour workshops) varied from one to three. In China, there were two conditions: a control condition without workshops and an experimental condition with two two-hour workshops over the course of two weeks.

The duration of the intervention in the two studies differed: in the Netherlands, the time between pre- and posttest was five months, whereas in China this was three weeks.

Common to the two studies was that in the workshops CATs were suggested to the teachers. CATs typically blur the divide between instruction and assessment, are low-tech and low-cost, and can be feasibly implemented by teachers. Every technique helps teachers to quickly find out something about their students' mathematics comprehension, provides indications for further teaching, and consists of a short activity (less than 10 minutes). Also, the techniques were introduced as completely adaptable to the teacher's own practice; the teachers could choose when and how to use the CATs.

In the Dutch study, the focus of the CATs was on the mathematics curriculum in the second half of Grade 3 in the Netherlands, meaning that they were mostly centred on mental calculation, in particular the domain of number knowledge and number operations up to 100 and 1000. In the Chinese study, the focus of the CATs was on the first chapter of the second semester of Grade 3, in which students learn how to solve multiplication problems of two-digit numbers mainly by written digit-based algorithm.

In both studies results from students' performance on standardized mathematics tests (district tests in China and national tests in the Netherlands) were obtained. Analyses of (co)variance were used to investigate the effects on student learning of supporting the teachers in their use of CATs.

Results and conclusion

In the Netherlands, students of which the teachers participated in three one-hour workshops on CATs had a significantly larger mathematics achievement score gain (+8.1 points) than students in all other conditions (+5.5 points; $d = 0.26$). Apparently teachers had to have participated in three workshops for their students to clearly benefit from the use of CATs.

In Nanjing, the students of the teachers that participated in the workshops on the CATs only very slightly improved their standardized mathematics achievement scores over time (+0.011). This improvement was not significant, neither in size, nor in the statistical sense. Contrary to these findings in the experimental group, the students in the control group did not improve their standardized scores from one test to the other (-0.012). However, on average the students in the control condition outperformed the students in the experimental condition on all three tests.

The two studies show different results, and differed on several design aspects, but it can nevertheless be concluded that supporting teachers' classroom assessment practice in mathematics can contribute to the improvement of students' mathematics achievement. Taking into account the different cultural and educational backgrounds – and the accompanying differences in the design of the CATs and effects on student learning – this pleads for paying more attention to teachers' use of classroom assessment in mathematics.

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