



**ASSESSMENT BELIEFS AND PRACTICES IN PRIMARY SCHOOL
MATHEMATICS EDUCATION IN BRAZIL¹
CRENÇAS E PRÁTICAS DE AVALIAÇÃO EM EDUCAÇÃO MATEMÁTICA
NOS ANOS INICIAIS NO BRASIL**

Jutta Cornelia Reuwsaat Justo
Universidade Luterana do Brasil –Brasil
juttareuw@gmail.com

Ednei Luís Becher
Universidade Luterana do Brasil –Brasil
edneibecher@gmail.com

Marja van den Heuvel-Panhuizen
Utrecht University – Netherlands
m.vandenheuvel-panhuizen@uu.nl

Michiel Veldhuis
Utrecht University – Netherlands
m.veldhuis@uu.nl

ABSTRACT

To gain further knowledge about how Brazilian primary school teachers perform and conceive assessment in mathematics education, we carried out an updated review of research literature on assessment in Brazil. Our scope on assessment was broad and included both large-scale assessment and classroom assessment. The research question was: *What does recent research reveal about Brazilian primary school mathematics assessment practices and teachers' beliefs?* The review covered publications between 2010 and 2017 in proceedings of Brazilian scientific conferences and in the national database of PhD theses and master dissertations. Large-scale assessments influence changes in the school curriculum, such as adding content or emphasizing particular content. Teachers feel controlled and evaluated by external assessments. When comparing assessment practices with assessment beliefs, we can see a mismatch between what is done and what Brazilian primary schoolteachers think. The teachers mostly believe classroom assessment to be a process that occurs in many moments at classroom and use different instruments. Nevertheless, the most used practices are testing students at the end of a school

¹ Trabalho decorrente de Bolsas da Capes. Jutta Cornelia Reuwsaat Justo foi Bolsista da Capes/ Pesquisa Pós-doutoral no Exterior/ Processo nº 88881.120678/2016-01. Ednei Luis Becher foi Bolsista da Capes/ Programa de Doutorado Sanduíche no Exterior Edital nº 19/2016/ Processo nº 88881.133333/2016-01.

period. The recommendations of the researchers point to teachers' in-service education. We understand that the mathematics assessment practices in Brazil still maintain some distance from what is understood by formative assessment.

KEYWORDS: Classroom assessment; Large-scale assessment; Brazilian research; Mathematics education; Primary school.

RESUMO

Para obter mais conhecimento sobre as crenças e práticas de avaliação em educação matemática de professores dos anos iniciais no Brasil, realizamos uma revisão atualizada da literatura de pesquisa sobre avaliação no Brasil. O escopo de avaliação foi amplo e incluiu avaliação em larga escala e avaliação em sala de aula. A questão de pesquisa foi: O que pesquisas recentes revelam sobre as práticas de avaliação em matemática e as crenças dos professores nos anos iniciais no Brasil? A revisão abrangeu publicações entre 2010 e 2017 em anais de congressos e no catálogo de teses e dissertações da Capes. Avaliações em larga escala influenciam mudanças no currículo, tais como adicionar ou enfatizar conteúdos específicos. Os professores sentem-se controlados pelos resultados dessas avaliações. Ao comparar as práticas com as crenças de avaliação, podemos ver um descompasso entre o que é feito e o que pensam os professores. Os professores dos anos iniciais acreditam que a avaliação em sala de aula é um processo que ocorre em muitos momentos e usa diferentes instrumentos. No entanto, a prática mais utilizada é testar os alunos no final do período escolar. As recomendações apontam para a formação continuada. Entendemos que as práticas de avaliação matemática no Brasil ainda mantêm alguma distância daquilo que é entendido por avaliação formativa.

PALAVRAS-CHAVE: Avaliação em sala de aula; Avaliação em larga escala; Brasil; Educação matemática; Anos iniciais.

1 INTRODUCTION

In the last half of the 20th century, in many countries around the world, educational reforms have taken place. Most of these educational reforms also advocated an assessment reform (BERRY, 2011) in favor of the view that assessment is an ongoing process interconnected with teaching and learning (e.g., SHEPARD, 2000; SUURTAMM; KOCH; ARDEN, 2010; VAN DEN HEUVEL-PANHUIZEN, 1996). This means that assessment “is a complex, all-encompassing process that fulfills a central role in instruction” (VELDHUIS; VAN DEN HEUVEL-PANHUIZEN, 2014, p. 3). However, not all studies that investigated the implementation of this approach to assessment came to positive findings. Berry (2011) concluded that following such

reforms only limited changes in assessment practices were found, as shown by the continuing emphasis on grading students and little emphasis on supporting their learning.

Also in Brazil, a reform in education and assessment took place. The in the 1990s published National Curriculum Parameters (Parâmetros Curriculares Nacionais – hereafter PCN; MINISTÉRIO DA EDUCAÇÃO, 1997), was meant to provide schools and systems with indications for elaborating their own curriculum, emphasized that in addition to large-scale assessment there should also be more attention for classroom assessment. This assessment was understood as “a part of the process of teaching and learning” (MINISTÉRIO DA EDUCAÇÃO, 1997, p. 20). However, currently, over two decades after the publication of this document, it is still not entirely clear whether and how this broad interpretation of assessment in which large-scale assessment and classroom assessment are both deemed important has found its way into primary school classrooms in Brazil.

Costa (2013) conducted a literature review of publications addressing assessment in primary school mathematics education. The publications for Costa's review were found in databases including papers presented at scientific conferences in Brazil, master's dissertations and PhD theses appeared between 2000 and 2012. Costa (2013) concluded that in the Brazilian research on mathematics assessment in primary school there is a strong focus on large-scale assessment and that classroom assessment is a missing topic.

For large-scale assessment, since 1990, Brazil has the National Basic Education Assessment System (SAEB), which currently contains the following examinations: National Assessment of Basic Education (Aneb), the National Assessment of School Performance (Anresc), known as Prova Brasil, and the Assessment National Literacy (ANA). In addition, Brazil uses large-scale assessments for monitoring education and identifying factors that may interfere with student performance. The examinations and monitoring assessments are elaborated by the National Institute for Educational Studies and Research (hereafter INEP). Besides the SAEB, the INEP elaborated, since 2011, a large-scale assessment test, the Provinha Brasil of Mathematics, as a pedagogical tool, with no classificatory purposes. The main objective of this test is to provide information

to teachers, managers and teaching networks of the level of literacy of students in the second year of schooling at two moments, namely at the beginning and the end of the school year. In addition, Provinha Brasil can be applied and corrected by the teacher of the class, so that the teacher has immediate access to the results obtained by her or his students.

In the current study, we wanted to gain further knowledge about how Brazilian primary school teachers perform and conceive assessment in mathematics education. For this, we carried out a new updated review of research literature on assessment in Brazil. Our scope in this research on assessment was broad and included both large-scale external assessment and classroom assessment for which the teacher is responsible. Our leading research question were: What does recent research reveal about Brazilian primary school mathematics assessment practices and teachers' beliefs?

2 METHOD

To investigate what recent research reveals about Brazilian primary school mathematics assessment practices and teachers' beliefs, we built on Costa's (2013) study and continued where she ended her literature review. This means that our review covered publications on assessment that were published between 2010 and 2017. The search for, and selection of, relevant publications was carried out in September and October 2017. First, we examined the proceedings of Brazilian scientific conferences on mathematics education and assessment. We started with the proceedings of two conferences that are governed by the Brazilian Society of Mathematical Education: the International Seminar of Research in Mathematics Education², and the National Meeting of Mathematics Education³. Then, we examined the proceedings of two independent educational research conferences: the National Meeting of the National Association of Post-Graduate Research in Education⁴ and the National Congress of Educational Assessment⁵. Finally, we searched for relevant publications in the national database of PhD theses and master

² <http://www.sbemrasil.org.br/sbemrasil/index.php/anais/sipem>

³ <http://www.sbemrasil.org.br/sbemrasil/index.php/anais/enem>

⁴ <http://www.anped.org.br/reunioes-cientificas/nacional>

⁵ <http://www.fc.unesp.br/#!/conave>

dissertations.⁶ All the queries that were carried out consisted of the keywords “Assessment”, “Mathematics”, and “Primary School” in the title, the keywords, and the abstract.

In the next step, we read the titles and abstracts that resulted from all these searches. Based on this reading, we found 54 publications, consisting of 34 papers from conference proceedings and 20 dissertations and theses. As a further step, we read the full texts to identify those publications that either addressed the assessment practice or the teachers’ beliefs on assessment. Publications addressing document analyses, teacher training, textbook analyses, and sociological analysis related to assessment were excluded.

Table 1. Publications on assessment in primary school mathematics education in Brazil published between 2010 and 2017.

		Focus of the publications		
		Teachers’ assessment beliefs	Assessment practices	Both
Type of assessment	Large-scale assessment	Blengini (2015)* Matos (2012)* Martins (2012)* Oliveira (2012)*		
	Classroom assessment	Silva (2014)* Zanon (2011)*	Borrvalho & Lucena (2015)** Mandarino (2012)**	Costa (2013)* Barbosa (2013)** Côrtes & Muniz (2016)**

* Master’s dissertation

** Conference paper

In the end, the search for, and selection of, relevant publications resulted in 11 publications to be included in the review (see Table 1), including 4 publications on large-scale assessment and 7 on classroom assessment. The publications on large-scale assessment all deal with teachers’ beliefs, while the publications on classroom assessment either are addressing teachers’ beliefs or the assessment practice or with both.

To figure out what research has revealed about assessment practice and teachers’ beliefs on assessment, we summarized each of the selected publications taking the type of assessment as a starting point. Then we analyzed the papers by focus, assessment

⁶ <http://catalogodeteses.capes.gov.br/catalogo-teses/#/>

practice, and teachers' beliefs on assessment, in two sections of findings related to: large-scale assessment or classroom assessment.

3 RESULTS AND DISCUSSION

3.1 Findings related to large-scale assessment

Four studies focused on teachers' opinions and beliefs about the results and usefulness of large-scale assessments. Matos (2012) investigated by administering a questionnaire by 17 primary school teachers' ideas about student results on the Prova Brasil in the northeastern of Brazil. Most teachers appeared to not really understand the results of this assessment and were rather opposed to a test only focusing on problem solving like Prova Brasil. For the teachers, problem solving was just one of the many methodologies they use in their classes. It also became clear that the teachers were not familiar with the standards that were used to elaborate the Prova Brasil.

In Oliveira's (2012) study, teachers' ideas about the use of the Provinha Brasil's results were further investigated by five teacher interviews conducted individually. She investigated how the teachers analyzed their students' understanding based on the answers they gave to the items that involved Statistics and their suggestions for activities to overcome difficulties. The teachers considered the test items as a curriculum, stating that they work more on the content presented in it. They had difficulties to interpreting the results of the Provinha Brasil test. According to the author, teachers have to be better prepared for the use of the results of this test to avoid misinterpretations. Furthermore, because many teachers wrongfully attributed students' mistakes to misconceptions, it is necessary to complement their mathematical training.

Martins (2015) investigated by means of interviews teachers' opinions about a different large-scale assessment, namely the Prova Brasil, Provinha Brasil, and Saesp, the external assessment that is used in São Paulo State. The publication of the results of this large-scale assessment bothered teachers as it leads to comparisons between schools. Additionally, the teachers considered it to be unfair that the state guided its educational

policies by the results of this external assessment. They were also rather divided about the usefulness of the assessment results.

Finally, Blengini (2015) interviewed primary school teachers, focusing on their beliefs about the importance of large-scale assessments for the quality of education. The teachers were not in favor of such external evaluations because they believed them to be a form of control, which could interfere with the school's choices of the curriculum content. It was clear for them that the evaluation model used was more a measuring instrument than an assessment tool that seeks to help the students' difficulties in guiding schools, because the results were not provided to schools in a way that could be employed in the assessment process.

The results of these four studies highlight in a way that the teachers are not convinced about the usefulness of large-scale assessments. They appeared to consider external assessment as a state intervention in school and doubted the effectiveness of this type of evaluation. Moreover, the studies showed that many teachers were not able to understand the assessment results and relate the standards of the tests to the school curriculum. Therefore, the researchers concluded that it is necessary to improve teacher education and offer opportunities for professional development.

3.2. Findings related to classroom assessment

Seven studies focused on teachers' classroom assessment beliefs and practices. In a questionnaire study, Mandarino (2012) investigated how often teachers, whose classes participated in the Prova Brasil, adopted a particular correction style in their own assessment practice. Four groups of teachers were distinguished according to the type of correction they favored: individual correction, collective correction, collective correction with attention to difficulties of the students, or the focus on the correct response provided by the teacher. In the first group, teachers individually corrected student activities by checking students' notebooks or collecting individual activities to be corrected overtime. Teachers from the second group made the collective correction of activities on the board and the students correct by themselves in their notebooks. In the third group the predominant correction was collective and happens on the blackboard by the teachers

through discussing problems in which students have difficulties. At times, students were also called upon to present their answers on the blackboard. The teachers in the fourth group most often did the written correction on the blackboard asking the answers to the students. These teachers did not make individualized corrections of student activities or even the correction of notebooks. The author raised the concern that, from the earliest years of schooling, students should develop self-confidence in their mathematics knowledge and have the autonomy to create and test hypotheses, which means that they must be allowed to solve a problem and validate their responses. Also several other factors, such as the types of activities that are proposed, the used textbook, and what the teachers do while students solve tasks, should be taken into account when interpreting the correction style a teacher adopts.

Costa (2013) investigated the assessment practices of 5th grade primary school teachers by providing a questionnaire to nineteen teachers and interviewing and observing two teachers. Teachers assessed students' learning mostly with paper-and-pencil tests. They also observed students' activities in an informal and unsystematic way. Some teachers pointed out that they evaluated their teaching daily, by doing and redoing their practices. They considered classroom assessment to be part of the more democratic teaching practices that were generally not carried out systematically and occurred spontaneously. One teacher pleaded for teaching mathematics mechanically which was considered to be a necessity to prepare students for the large-scale assessments. By practicing similar problems in class, the external test was prepared. This teacher explained that such a routine-marked procedure, as in the large-scale assessments, becomes easier when practiced frequently. The author's comment to what she found in her study is that many important classroom activities could be mobilized by teachers as assessment moments, such as homework and other production of written records by students (texts in games and group activities). According to the author these are activities that can provide the teacher with evidence about the development of students' knowledge. She concluded that it is necessary to improve mathematics assessment and that continuous education should build on teachers' current assessment practices, possibly leading to reflection on, and systematic appropriation of, new teaching guidelines.

Borrvalho and Lucena (2015) investigated the relations between teaching and assessment practices, as well as the improvement of students' learning by classroom observations and interviews with teachers in Portugal and Brazil. In both countries, teachers did not much use formative assessment in their teaching. In fact, assessment was not deliberately, systematically, or consciously present in the teachers' teaching. Teachers' use of assessment was sporadic and not focused. They did not use assessment to plan and replan their practices and generally not used to improve students' learning. The instruments used were summative tests and complemented by opinions of activities carried out in the classroom. It was more aimed at classifying and grading students at the end of the school period.

Using a questionnaire with open-ended questions, Barbosa (2013) investigated what were the beliefs on assessment in mathematics and which were the assessment instruments used by nine primary school teachers of a public school in Southeast Brazil. Most of them considered assessment to be useful for diagnosing students' learning and used day-to-day activities, such as participation in class and the use of concrete material, to assess their students' learning. Other teachers, who believed assessment to be a measure of student knowledge, used more formal assessment activities, such as bimonthly tests. Four teachers believed that students' mistakes are a way of guiding further instruction. Five teachers saw errors as a help for making students aware of their achievement and their need for improvement.

Côrtes and Muniz (2016) analyzed two teachers' mathematics assessment practices as observed in their classroom, and their assessment beliefs as expressed in a semi-structured interview, group meetings, and observations. The only formal assessment instruments that both teachers used were bimonthly written tests. The questions in these tests were reproductions of tasks that had been taught in the classroom. Also from the observations, it seemed that assessment was mostly used to measure student learning. Teachers used a linear approach to the content to be taught and used tests to assess at the end of this process. The authors believed that one of the necessary actions is to transform the schools' pedagogical coordinators responsible for the in-service education and consolidation of teachers' collective work. Furthermore, they emphasized that it is

necessary to further elaborate assessment by promoting the interaction between students, discussing different processes and solution strategies, and offering metacognitive hints to the students. Finally, they advocated that by mobilizing students' knowledge, creating chances, being free to make mistakes, thinking about mistakes, and creating the necessary experiences, teaching and learning mathematics will have more meaning for students.

Zanon (2011) used questionnaires and group meetings to understand primary school teachers' knowledge, beliefs, and conceptions about mathematics and its assessment. Participants were 23 teachers who worked in rural schools in the east of Brazil. They believed that assessment should happen in a procedural way, that it is an instrument to verify student learning, and that it is necessary despite being permeated by negative feelings and effects. The teachers had difficulties and doubts about specific content of mathematics. The author also noted that they had a traditional view of mathematics assessment and had negative feelings about mathematics assessments. To assess their students, most participants mentioned the use of classroom games, individual tests, and mechanical math activities in classroom and by homework, supplemented by individual observation of the students work. The author advised that it is necessary to teach with understanding and to provide continuous education to teachers about effective assessment problems and the metacognitive processes of teaching, learning, and assessment in mathematics.

Silva (2014) investigated how assessment contributed to the organization of mathematics teaching in a primary school in the South of Brazil. Assessment activities were used by planning and implementing a school travel with 5th grade students. As assessment instruments the teacher used the students' competence of data collection and the clarity of organizing the data. In a newspaper format the students had to present the results of the data collection by means of graphs and a small explanatory text. The study revealed that the teacher' conceptions of assessment were broad and permeated the entire process of teaching and learning. Silva (2014) stated that when the teachers take the role of teacher-researchers, they may be teaching supported by knowledge gained through the constant assessment of their instructional practice and student learning. She concluded that ongoing assessment, providing the teachers with more insight in student learning,

during teaching was considered to be fundamental to improving the quality of teaching and, consequently, teacher and student learning.

When comparing assessment practices with assessment beliefs, we can see a mismatch between what is done and what Brazilian primary schoolteachers think. The teachers mostly believe classroom assessment to be a process that occurs in many moments at classroom and use different instruments. Nevertheless, the most used practices are testing students at the end of a school period. Considering the recommendations of the researchers, they mainly point to teachers' in-service education. In addition, the PCN affirm that some of the problems related to mathematics teaching are related to the process of teacher education, in relation to both initial and in-service training (MINISTÉRIO DA EDUCAÇÃO, 1997).

The researchers justify the needs to improve the training of mathematics teachers in the initial years of elementary school for different reasons: teachers did not understand the results generated by large-scale assessments and cannot make relation between school curriculum and test's reference standards; and, teachers attributed student's mistakes to misconceptions they had about some content. In addition, the researchers recommend that teacher training: clarify the assessment structure, methodology and objectives, which makes the process of understanding and using the results easier; identify the relationships between different contents and skills present in the large-scale assessment items; discuss how to use the results of large-scale assessment as an element of their planning to promote assessment to learning; discuss, plan and carry out activities involving teach math skills; complement teachers' training in relation to mathematical knowledge; reflect on the practice developed by teachers; and introduce new teaching guidelines.

4 CONCLUSION

Large-scale assessments, even if not approved by teachers, influence changes in the school curriculum, such as adding content or emphasizing particular content. As found in the surveys, teachers feel controlled and evaluated by external assessments. As a result, they instruct students to these tests and use items like a guide to the curriculum. From the results of the researches, we understand that the mathematics assessment practices in

Brazil still maintain some distance from what is understood by formative assessment. There is still a lot to do and research so that the practices of formative assessment reach the Brazilian classrooms. Despite the mostly beliefs on assessment is a process to improve teaching and learning, we can conclude that the mathematics assessment practices carried out in Brazilian primary schools do not yet favor assessment to learning, but are most used as an instrument to determine students' classification at the end of school periods.

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