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Alignment of mathematics curriculum to standards at high schools in Colombia

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The design of Mathematics curriculum in Colombia has been influenced by the curricular guidelines (MEN, 1998) and Basic Standards of Competence (MEN, 2006). These official documents have been the baseline to decide how to conduct the math curriculum parameters in schools. Specially, the basic standards of competence document provides teachers with a set of guidelines for what students are expected to know and be able to do, defining the intended curriculum. However, there is a lack of coherence between these parameters and what the teachers design in their school curricula. We analyzed the alignment between the mathematics curriculum of a sample of Colombian schools and the document of basic standards of competences at high schools in Colombia. We found an inadequate alignment between the schools' mathematics curriculum and the official document of basic standards of competence.

Keywords: Alignment, Mathematics curriculum, Standards

Law 115 of 1994 and curricular autonomy

The curriculum in Colombia has suffered many different changes or transformations based on political parameters or requirements. In 1994, the Ministry of National Education (MEN) stated the Law 115. This law organized the educational services in Colombia, through general rules. In this law, the government established the curricular autonomy of schools. This means that schools have autonomy to make and adapt their curricula. Also, the Ministry of National Education has proposed some guidelines in terms of learning expectations called Basic Standards of Competence (MEN, 2006).

Basic Standards of Competence (2006)

Mathematical competences are related to mathematical thinking and mathematical systems. The standards are based on these mathematical thinking and systems. These guidelines contemplate the competences that a student must achieve when a cycle of two school years ends.

Alignment to standards

In the past, the most common educational use of the concept of alignment referred to the match between an assessment instrument (or instruments) and a curriculum (Webb, 1997). Alignment does not only refer to a comparison between one assessments instruments with a curriculum, but extends to a set of assessment instruments or the assessment system. However, Webb has defined the alignment as “the degree to which expectations and assessments are in agreement and serve in conjunction with one another to guide the system toward students learning what they are expected to know and do” (1997, p. 12). An area plan is a curricular document that has the objectives, the

methodology, the distribution of time, and the evaluation criteria for a subject, in our case, the area of mathematics. The area plan becomes the roadmap that guides the implementation of the mathematics curriculum within schools. The alignment with standards is a characteristic of Colombian area plans. We assume the alignment with the standards as the measure to which the mathematics area plans approach the contents proposed in the standards. With this attribute, we seek to determine how much is covered of the subjects in the area plans according to what it is stated in the official document of the standards. For a specific syllabi and specific topics, the alignment should indicate to what extent that area plan meets the standards proposed to these issues.

Methodology

We collected a sample of 212 syllabi throughout the country taking into account three main variables: geographical area (rural and urban), type of institution (public and private) and type of secondary education (academic and technical). In addition, we built code trees based on the didactic analysis carried out on three subjects of school mathematics. The topics chosen are the conic sections, the derivative and the descriptive statistics. The process of coding the 212 area plans consisted in identifying the text segments that allude to the proposed topics. Once these text segments were identified, they were assigned to label each one with a code of the code tree in N-Vivo program. Similarly, we coded the standards document as if this document were an area plan. After coding the documents, we proceeded to make a comparison between each area plan and the standards. Once the sources were compared, we proceeded to count the codes that each syllabi document shares with the standards document. We constructed a statistical variable with this measure. The value of this variable for an area plan is equal to the quotient between the number of codes that the area plan shares with the standards document and the total number of codes assigned to the standards document.

Results

We found that the sample mean of the variable is 29,19%, with a standard deviation of 13,36% which means that there is a low alignment and a great variability in the alignment percentage of the area plans and the standards document. At 95% confidence, we found a confidence interval of the population mean of Colombian area plans of (27.31%, 31.07%). The area plans should be aligned to the curricular parameters and standards; however, we found evidence that these plans do not fit what the Law established causing a gap on secondary education, mainly on tenth and eleventh grades.

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