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BUSINESS INTELLIGENCE IN LARGE ASSESSMENTS SCALE OF BREAKING TERATOLOGICAL AXIOMS TO THE *ETHOS* CONTEMPORARY

BUSINESS INTELLIGENCE IN LARGE-SCALE EVALUATIONS OF THE BREAK OF TERATOLOGICAL AXIOMES TO THE CONTEMPORARY ETHOS

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Summary

The present work aims to analyze intelligence tools (*Business Intelligence*–BI) within the evaluation process, on a larger scale, of education networks and how such tools can provide education managers with information to anchor decision-making. Large-scale assessments have a wider scope than the pedagogical sphere and nowadays cover other areas such as economic and social. As an instrument for capturing, organizing and processing large volumes of collected data, this technological tool allows abstracting and transforming these structures into visualizations that allow managers to systematize planning into effective actions in the face of the challenges of managing a billion-dollar budget such as that of Brazilian education. . **Key words:***Business Intelligence.*Educational management. Budget management. Large-scale assessment. Brazilian education.

Abstract

This work aims to analyze the intelligence tools (Business Intelligence - BI) within the process of evaluating, on a larger scale, the education networks and how these tools can provide education managers with information to anchor decision making. Large-scale assessments have a broader scope than the pedagogical sphere and in contemporary times they cover other areas such as economic and social. As an instrument to capture, organize and treat large volumes of collected data, this technological tool allows abstracting and transforming these structures into visualizations that allow managers to systematize planning into effective actions in the face of the challenges of managing a billionaire budget such as that of Brazilian education.

Keywords: Educational management. Budget management. Large-scale evaluation. Brazilian education.

1. Introduction

Common sense prevails that school assessment is something bad and unnecessary. The fact is that large-scale school assessments are a reality in Brazil, and are present from early childhood education until graduation. All public and private networks use evaluation systems not only among students, but also with teachers, managers and even, more recently, in public-private partnerships.

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Not infrequently, the application of evaluation, until recently in Brazil, had a character much closer to punitive, however, with the advent of new technologies, such as *Business Intelligence* and its analogous versions, a new perspective has been established by educational managers at all levels. Following an international trend, these technology instruments are capable of helping to consolidate data and information which, in turn, can be used to produce knowledge about a nation's educational universe. This is because the knowledge abstracted from the primary source of data, which large-scale evaluations provide for analysis, helps in decision-making and, ultimately, in proposing public policies. According to Souza and Ferreira,

> From this period, until the mid-1970s/80s, educational assessment received significant contributions and was consolidated as a theory with its own object and methods for carrying out increasingly precise diagnoses on the performance of the student, the teacher, the institution school and the education system itself. (SOUZA ; FERREIRA, 2019, p. 14).

With increasingly dense layers in their decision-making levels, school institutions (federal, state and municipal) and private organizations need to continually review pedagogical practices and teaching and learning strategies, always focusing on continuous improvement. of the results and performance of its students.

Evaluating on a large scale, based on artificial intelligence and the use of statistical technologies, applied to computational analysis, provides greater speed in processes (logistical and operational), but, above all, in the treatment related to didactic and pedagogical planning in the processes of teaching and learning.

In fact, large-scale evaluation systems have a role that goes beyond simply evaluating primarily. Evaluation in large networks has a social intervention character; it transcends the walls of learning environments, its effects extend into political, economic and social spheres.

Evaluating on a scale, and with the use of computational tools that can bring to light perspectives and prisms that were previously unused or even revealed, allows managers, distributed in their distinct hierarchies, to obtain data and information that are supported by two fundamental pillars: diagnosis and regulation.

From this perspective, school administration uses *Business Intelligence* or business intelligence, as it is known in Brazil, not only for collection, but as organization, analysis and monitoring of information that assessments allow to abstract.

All the transformation and processing of information contained within this large volume of data, or as it is known, the *bigdate*, provides support for route correction and planning, assists in the interpretation of trends and behaviors, and also provides opportunities for breaking or deconstructing crystallized axioms about education and its problems, whether globally or even on a specific basis. With a more realistic perspective and based on numbers, this business intelligence encourages, in a way, a more rational interpretation and, in the same proportion, uncovers new opportunities and is consistent with effective strategies that need to be based on data and information to promote decision making. more assertive in the short and medium term. From this perspective, Costa, Vidal and Vieira discuss:

> The evaluation of education in Brazil, as a form of regulation, is made possible by improving the production and dissemination of educational statistical data. In other areas of the world, this factor will also be decisive for the insertion of a culture of accountability, since, with methodological and technical advances in the large-scale assessment of learning, more precise and sophisticated instruments have been established. (COSTA, VIDAL ; VIEIRA, 2019, p. 12).

In view of the above, some uncomfortable questions arise: How do these large-scale assessment tools, available on the market, and their functionalities perform to satisfy the demand for data and information from education networks in Brazil? Once used, what do they offer from a qualitative and quantitative point of view to support decision making? How the *Business Intelligence*, integrated with these tools, can it contribute to changing the scenario in the field of Brazilian educational management?

2 Methodology

This article has the character of exploratory research anchored in bibliographical surveys that support theoretical reflections, in order to document the structure, encourage analysis and expand the core of the discussions and questions that arise in the use and application of business intelligence in the field of education, more specifically in educational management.

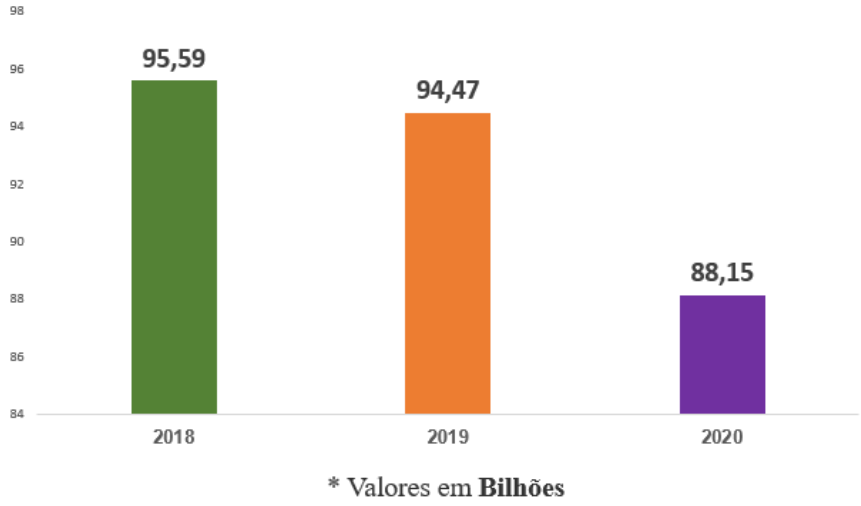
3.Theoretical foundation

3.1 The scenario

Evaluate to plan better. This is a maxim in administration and could not be different in the educational sector. According to the transparency portal (Comptroller General of the Union, 2021), education was the Brazilian economic sector that closed 2020 with a consolidated budget of R$88.15 billion. This paradox, investment versus results in proficiency, is embedded in the Brazilian social fabric. In this aspect, evaluating on a large scale, abstracting data and information that can guide decisions at the management level, are imperative.

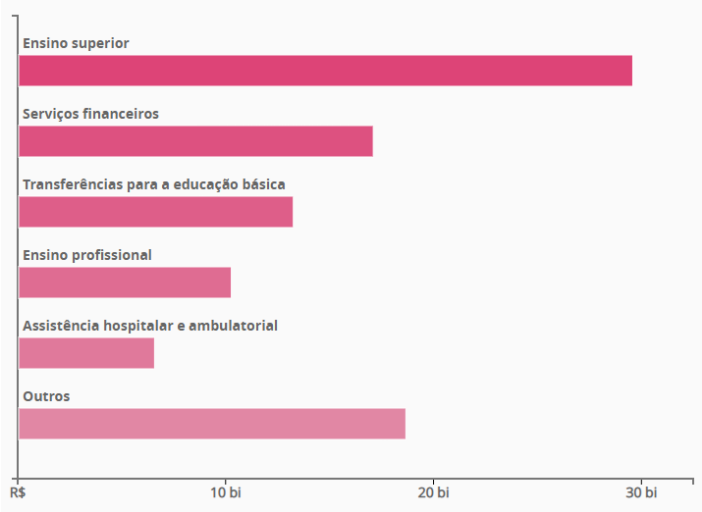
Souza and Ferreira (2019) state that large-scale evaluation has already reached a good level in Brazil and has the possibility of guiding the planning of state and municipal departments, as well as the Ministry of Education.

Graph 1. Total expenses incurred in the area of education in Brazil (2018 to 2020)



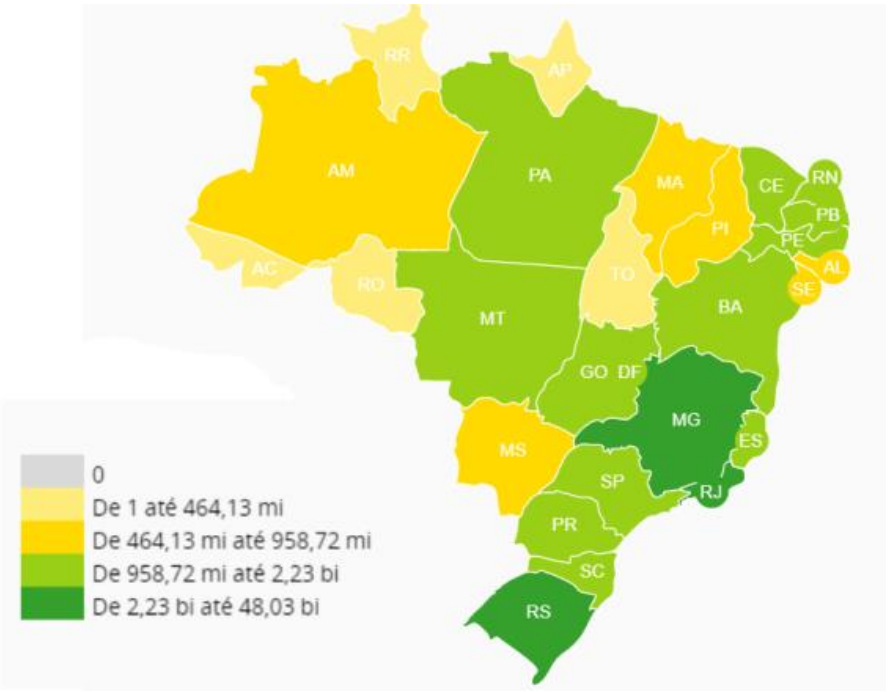
Source: the author, based on data from the Transparency Portal (Comptroller General of the Union, 2018,2019,2020).

Graph 2. Expenses by area



Source: Comptroller General of the Union (2019). Figure 2.

Expenses by location of Education spending



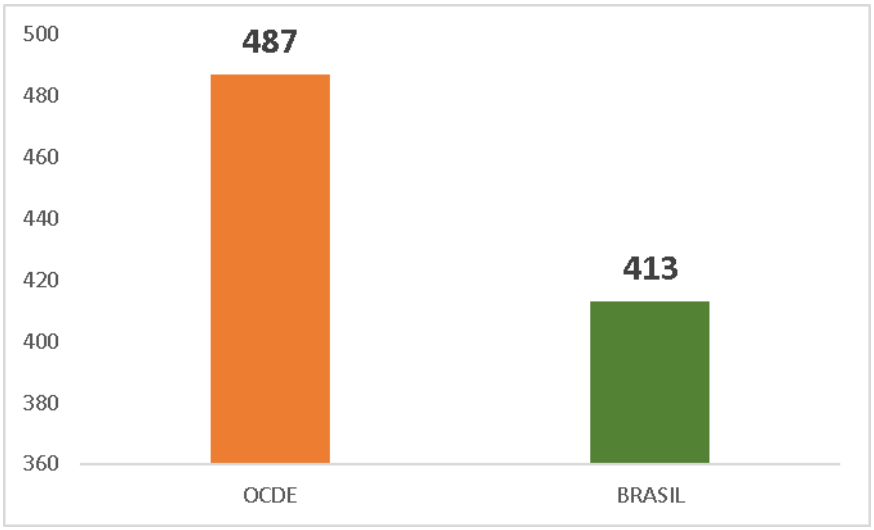
Source: Comptroller General of the Union (2019).

The National Institute of Educational Studies and Research Anísio Teixeira (Inep), on its portal, informs that:

> The largest study on education in the world, the International Student Assessment Program (Pisa), found that Brazil has low proficiency in reading, mathematics and science, compared to 78 other countries that participated in the assessment. The 2018 edition, released worldwide on December 3, reveals that 68.1% of Brazilian students, aged 15, do not have a basic level of mathematics, the minimum for the full exercise of citizenship. In science, the number reaches 55% and, in reading, 50%. The rates have been stagnant since 2009. (National Institute of Educational Studies and Research Anísio Teixeira, 2019).

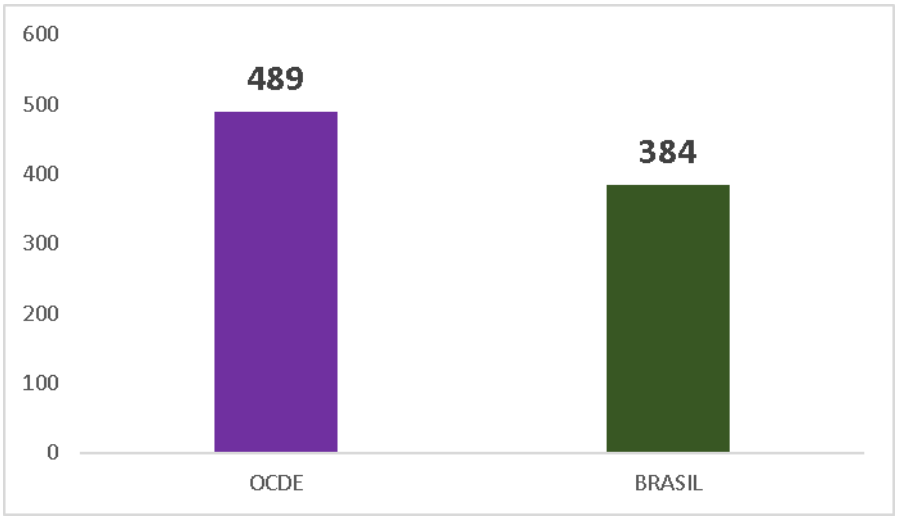
Still in this sense, INEP is accurate in stating that when comparing the level of proficiency in mathematics in relation to students from other countries, such as Uruguay, Chile and Colombia, Brazilians are behind, in a position classified as the worst.

Graph 3. Reading Skills and Competence — PISA



Source: National Institute of Educational Studies and Research Anísio Teixeira (2019)

Graph 4. Skills and Competence in Mathematics — PISA 2018



Source: National Institute of Educational Studies and Research Anísio Teixeira (2019)

Given the facts exposed and the *Trade Off*[10] installed, the association of *Business Intelligence* in large-scale evaluation processes it contributed positively. To assess

[10] *Trade Off* It is the name given to a choice that is made to the detriment of another. For example: people face the trade off between consumption and leisure. In other words, to obtain more consumption it is necessary to work more, therefore, giving up leisure time.

therefore, it transcends and expands the pedagogical dimensions in which assessment systems were used.

The political, economic and social dimensions with the advent of business intelligence, intertwined and articulated in exams, allow managers to be offered a wider range of data and information, whose applicability ranges from simple, everyday issues, to implementations of public policies, actions economic practices and even social interventions. According to Bauer, Alavarse and Oliveira:

The educational reforms implemented in recent decades are characterized by a set of measures that articulate the following aspects:

> a) centralization of evaluation systems, which are now used as management tools and feed accountability policies combined with census designs for external evaluation;
> b) decentralization of management and financing processes, which strengthen the discourse of school autonomy and democratic management, with a view to improving results, which includes financial autonomy to seek new sources of resources, other than traditional public sources, and new forms of public education management, which includes financial management autonomy and management autonomy (*school-based management*);
> c) expansion of choice possibilities (*choice*), stimulating competition mechanisms between schools, which would lead to an improvement in their quality; It is
> d) valuing results and seeking greater effectiveness of the service offered (*school effectiveness*) (BONAMINO, 2013; LEVIN, 2001; OLIVEIRA, 1999, 2000). (BAUER, ALAVARSE ; OLIVEIRA, 2015, p. 1369).

Extraction — transformation and loading of available data and information content — with the application of exams, the crystallized axiom of common sense regarding education and its properties is revealed and, in a way, deconstructed. Therefore, the best way to predict the future is to plan for it. In such a way that Business Intelligence (BI) computational tools are consolidated as an alternative that allows managers, in addition to planning, organization and control, to apply the five principles of public administration: legality, impersonality, morality, publicity and efficiency.

Assessment is a powerful ally in teaching practice. It is fundamentally premised on the possibility of verifying the achievement of the objectives proposed in planning the content that will be offered to students regardless of the modality, form or level of education. Structurally, it serves as an instrument for reflection on teaching and learning processes in terms of pedagogy.

In fact, establishing an evaluative culture that is effectively at the service of the convergence between teaching and learning is sometimes difficult in Brazil, to the detriment of a culture that does not value organization and control. The issue postulated in education networks is aggravated by the social problems of teachers (remuneration,

curricular ordering, discontinuity of programs) and, not infrequently, the pressure of external assessments, as is the case with PISA.

It is important to highlight that, in practice, evaluation processes carry in their composition a construct of organized theoretical approaches, not only to learning, but also to the social fabric in which those evaluated are inserted.

Therefore, the data and information collected by the system in the evaluation process need to be a source of collection and abstraction so that, once analyzed, they can generate indicators. In this sense, BI tools offer the possibility of working with indicator visualization components to make information explicit for both pedagogical and administrative purposes for managers.

An interesting point about BI, which is important to highlight, is the ability to visualize the knowledge and skills that are sometimes implicit in the range of data, and that only people with technical and mathematical skills, with specific training, would have access to, however with BI tools this is accessible to everyone. An advantage that business intelligence presents is the ability to establish measurement points that are known as indicators, whose main characteristic is to specifically signal a situation through signs. In its structure, it has calculated measures and formed by metrics, which makes it a powerful analyst. These indicators are KPI's –*Key Performance Indicators*(Key Performance Indicator). In large-scale assessments, the use of these indicators is fundamental, as they allow, within pre-determined basic or complex parameters, at the end of the data abstraction and modeling process, to support the monitoring of the goals set or associated with the planned development or expected performance of populations.

Figure 3. Representation of KPI's materialization in graphical layouts.



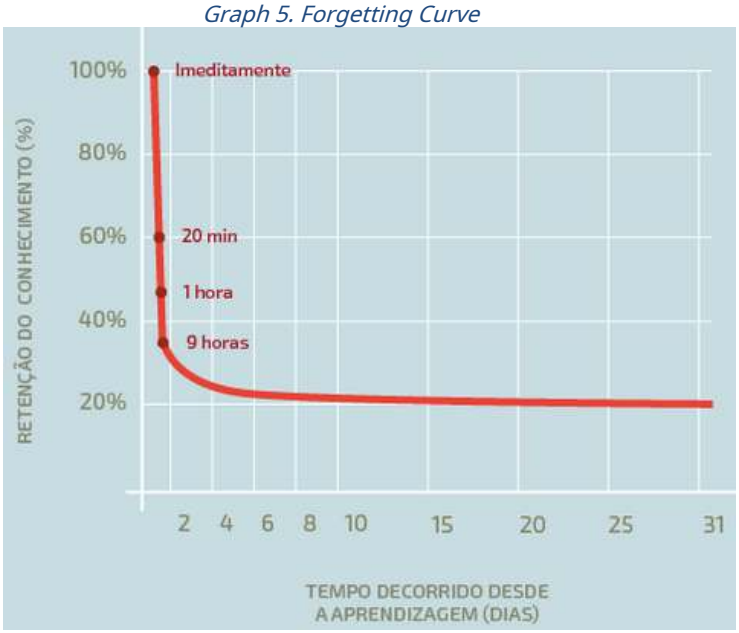
Source: the author

All planning developed using these indicators can often establish the limits of data frequencies (lower limits and upper limits) that are presented with the behavior of the people involved in the evaluation process. When using business intelligence in evaluation systems, at the service of managers, two points must be highlighted:

• Theory of the item response: in summary, it can be understood that, from a grouping of responses presented by a conglomerate of respondents to a set of items, IRT allows the estimation of the parameters of the items and individuals scaled by measure. In short, the IRT qualifies the item according to three parameters (1. Discrimination power, which is the ability of an item to distinguish students who have the required proficiency from those who do not; 2. Degree of difficulty; 3. Possibility hit by chance known as a shot).

• Mitigation of the forgetting curve: presupposes a drop in memory retention knowledge acquired and present in memory over time. This curve explains the dynamics of how knowledge fades over time, when there is no effort to retain it. With recurring evaluation systems and at determined time intervals, they allow for the correction of the planning route and incisive actions with students in order to mitigate or even interfere with the forgetting curve.

Graph 5. Forgetting Curve



Source: Sambatech (2019).

These two elements represent an evolution regarding the use of technologies in assessment systems, and largely deconstruct the axioms

teratological approaches to education, with analyzes supported by statistically stratified data, and with graphic and visual representations, which supports decision-making, directs effective actions towards the *ethos* and their political, economic and social demands.

Final considerations

School management in large education networks requires administrators to make decisions that have a profound impact on pedagogical, economic and social issues. Decisions made by school managers in their respective spheres and networks currently require a greater range of data. Such information can be obtained through large-scale assessment.

This instrument, when associated with business intelligence (BI), aims to automate the production of results obtained, favoring technical and pedagogical feedback, either through the construction of structured views of the data or through the production and availability of queries (synthetic and analytical).) of the results. From the production of comparisons, which can be in groups or even individually, on the performance of participants (classes, groups, specific schools), there is also the ability to analyze the performance of classes and schools at different levels or teaching stages and curricular components. Business intelligence tools enable the production of analyzes (quantitative and qualitative) about learning, relating to the educational skills and competencies assessed. The use of large-scale assessment transcends pedagogical issues and treatments. Not only does it allow automating the operational procedures inherent to the application of learning assessment (whether in printed form or *on-line*). Regarding economic issues, these tools make it possible to evaluate, through proficiency analyses, how the group of people affected is stratified in terms of the impact of education on their performance in relation to the investments that were allocated or the financial efforts involved and applied. In effect, all analyzes arranged within a *dashboard* they serve for better interpretation and consequently for effective social actions, including public policies that have a direct impact on the social life of the groups involved in the evaluation.

Therefore, it can be concluded that large-scale evaluation systems that use business intelligence are tools capable of providing information and supporting managers with a set of devices, including graphics, for decision making.

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