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USE OF ENEM GRADE AND STUDENT PERFORMANCE AT UNIVERSITY TO INFERENCE ABOUT THE QUALITY OF BRAZILIAN BASIC EDUCATION

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Abstract: The objective of this work was to try to reflect on the quality of Brazilian Basic Education from two complementary metrics. The first of these was the ENEM grade in Mathematics, used by students for admission to the Interdisciplinary Baccalaureate in Science and Economics (BICE) at a public university in Brazil. The second element was the performance of these same students in Mathematics I (Calculus I), which is mandatory in the first semester of this undergraduate course. Based on the analysis carried out, it was found that, on the one hand, the number of students who had all their training in public schools is about 70% of the academics. The students' grade in ENEM was not radically different from the content learning, perceived by them, in Basic Education. In terms of approval in the Mathematics I subject (at the university), it has been noted that this did not accompany the approval of students in Mathematics at school.

Keywords: ENEM, Mathematics, Basic Education, Higher Education.

INTRODUCTION

Education is a fundamental ingredient for the development of a country (CALEIRO, 2011). Through REUNI (Restructuring and Expansion of Federal Universities, carried out from 2003 to 2012), the Brazilian government generated an increase in the number of places offered in Higher Education (BRASIL, 2007).

The states and municipalities implemented measures to reduce school dropout and failure in Basic Education (BRASIL, 2007).

Despite the efforts just mentioned, Brazil continued to occupy the last positions in the international rankings of quality assessment (OECD, 2015) of education and this can also be confirmed through the IDEB (Basic Education Development Index). In 2015, there was 3.7 as an average (national) for high school, and 4.5 as an average for the last years of elementary school. These grades refer to students from the state public school system, responsible for training, for example, 85% of high school students in the country (BRASIL, 2015).

On the other hand, through the educational census, released by INEP, for 2015 the percentage of those approved considering the 3 years of high school (for the state public network) was 79.6% (BRASIL, 2016). Here it is relevant to highlight that for a student to be considered approved, he/she must have achieved at least 60% of the content (BRASIL, 2009). Therefore, based on the data from the IDEB and the Educational Census, there is an incompatibility of the results. If 88% of the state public high school graduates are approved, how is it possible for the IDEB associated with them to be only 3.7?

There are some possible explanations for this phenomenon. One of them is that the approval obtained by students from the state public school system happens without, in fact, having learned 60% of the content taught.

To investigate whether it is possible for

students to complete high school in the state public network without having the minimum knowledge necessary for this, this work was built. This was done considering two test situations external to the school: ENEM (National High School Exam) test and performance in the Mathematics I (Calculus I) subject of the Interdisciplinary Baccalaureate in Science and Economics (BICE) at the Federal University of Alfenas (UNIFAL)-MG).

The ENEM score is based on statistical modeling of Item Response Theory (IRT) and such that they range from (around) 200 to (around) 1000. In addition, it is the combination of the performance of the assessments in five areas: Languages, codes and their methodologies; mathematics and its technologies; Science of Nature and its technologies; Human Sciences and their technologies; and Writing (BRASIL, 2016).

In the case of BICE, the minimum grade required in ENEM was 400 points (UNIFAL-MG, 2016). Since the beginning of the course, Mathematics subjects, especially Mathematics I, were the ones with the highest failure rates (DUARTE and RAMOS, 2016a).

MATERIALS AND METHODS

In order to infer about the quality of public high school education, the authors analyzed two pieces of information: grade in Mathematics from ENEM and performance in Mathematics I for academics of the Interdisciplinary Bachelor of Science and Economics.

The main set of data used in the study was obtained through the (voluntary) completion of a questionnaire made available to veteran students or BICE graduates. The reason for using this mechanism was because the institution, through the Department of General Records and Academic Control (DRGCA), only makes available the final ENEM grade

and not those for each area required in the exam (that is, it is not possible to know how much the student achieved in Mathematics, specifically). Additionally, students also answered how many times they took the course – in school - until they are approved, in addition to providing information that would be difficult to obtain otherwise: what type of institution (public or private) they studied in elementary and high school.

However, this was not the only information that supported the conclusions drawn throughout this study. The records of the DRGCA (Directorate of General Registration and Academic Control) were also used, containing the situation of all newcomers to BICE, from the first semester of 2009 to the second semester of 2015. In total, 31 classes were analyzed, including freshmen and veterans who did not pass Mathematics I the first time they took the subject at university.

Based on the information, a quantitative analysis was carried out to investigate associations between the grade in Mathematics at ENEM and approval in the Mathematics subject at the university.

RESULT AND DISCUSSION

Based on the 208 questionnaires answered, the first step was to verify the pattern of grades (in Mathematics) in the ENEM of BICE entrants since the course began operating in 2009. As mentioned earlier, due to the fact that the ENEM is formulated based on the TRI, the lowest and highest score of the National High School Exam, varies from year to year. Because of this, the choice was made to stratify this information, that is, to consider the following categories: grades lower than 400 points; grades between 401 and 500 points; values between 501-600; results between 601-700; 701-800; and, finally, greater than 800.

Part A of Fig. 1 shows the percentage of students for each of the previously pre-

established categories. It can be seen that the share of academics with extremely low entrance grades (less than 400 points) was practically the same as the students with the best grades (above 800). It was also noted that about 60% of the new entrants obtained grades ranging between 500 and 700 points. In part B of Fig. 1, the relationship between the performance of students in the selection test (ENEM) and the type of school in which they studied in Basic Education was shown, that is, if their training was in public, private or both.

One of the aspects that deserves to be highlighted is the fact that among the group of students who have always studied in a private school, none of them had an extremely low score, that is, below 400 points. Another important fact to note is that for students who studied from 75% to 100% in public schools, practically half had a performance below 600 points, double that observed in the group of students from private schools.

It is worth noting that Fig.1 and Fig. 2 refer to all students who entered BICE, regardless of the type of institution (private or public) in Basic Education. In Fig. 2, it is possible to observe how these same students performed in Mathematics I at the university.

Part A of Fig. 2 shows the percentage of students who passed the first time they took Mathematics I (at the university) and the percentage of students who failed, including those who failed more times. It is noted that 40% of them said they had passed Mathematics I the first time they took it. In this sense, it is worth noting that this index does not match the total/official data provided by the university, which indicates that only about 30% of the students were approved in this discipline the first time they enrolled (DUARTE and RAMOS, 2016b). This difference, however, does not invalidate the study and/or its conclusions. Even using

information from a (significant) set of students (208), it is understood that when using a sampling methodology, one naturally works with the possibility of investigating biased data. In this case, specifically, it is believed that the bias (trend) occurred because, since the research was built based on information from a questionnaire, the answers are a consequence of the choice of participation in the research, which implies the selection of students. who are more dedicated and/or interested in improving the course they are part of.

Part B of Fig. 2, in turn, displays the students' performance in Mathematics I in relation to their ENEM grade. It can be seen from the data that among the students who entered BICE with math scores below 400 points, none of them managed to pass the first time they took Mathematics I. Another interesting aspect concerns the group of students with the best grades in ENEM (above 800 points). These were either approved immediately, or attended the course several times. A possible justification for failures in the latter group is the fact that many students who enter BICE do so for reasons that do not include a desire to earn a bachelor's degree in Science and Economics. That is, they are academics with little motivation and attending university due to the status of studying at a public university, or even the proximity of the university to the residence of their family members. Thus, the subjects that demand greater dedication end up receiving less attention and, consequently, resulting in failure.

Still on part B of Fig. 2, it is possible to notice that the majority of students with a grade lower than 400 points (which indicates a deficiency in basic education in mathematics) passed the subject by taking it twice. That is, the first failure was due to lack of basic knowledge, but the second time they attended the discipline, they managed to achieve the

ENEM grades (Math section)

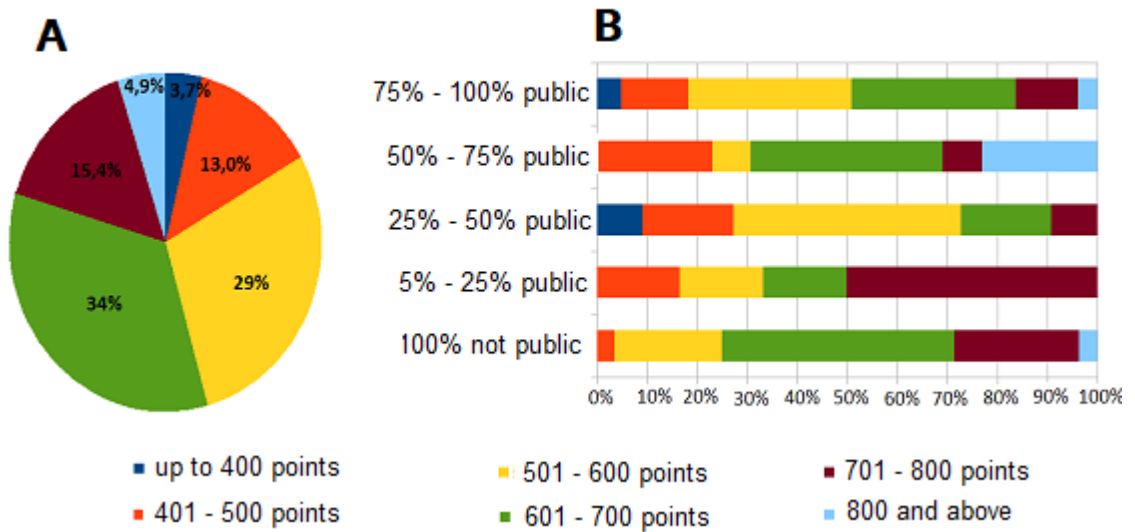


Fig. 1. A) BICE students' grades in the ENEM Mathematics test. B) The same as in A, but separating according to the time the student attended public school in Basic Education (Elaborated by the authors).

Performance in Math I discipline

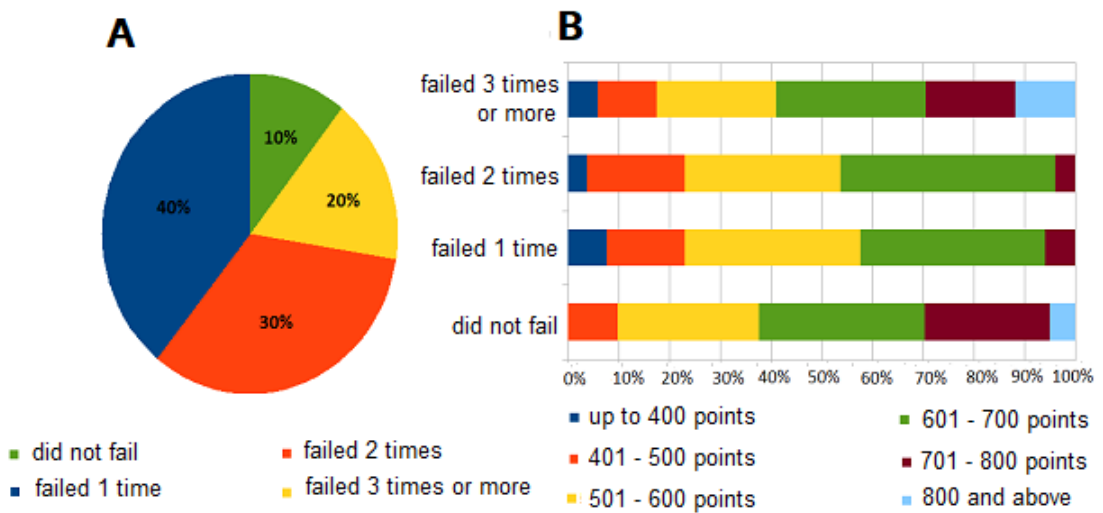


Fig. 2. A) Performance of BICE students in Mathematics I. B) Distribution of students by score level in the ENEM test for the situations presented in A. (Elaborated by the authors).

expected result. This may indicate that REUNI is in the right direction, and once a citizen has the opportunity to enter Higher Education, even with difficulties, the tendency is that he will take advantage of the opportunity and overcome the deficiencies in his previous training.

Figures 3 to 6 were constructed with the objective of analyzing the performance of those students whose Basic education training was carried out, totally or partially, in a public school. In this sense, Fig. 3 shows the math scores on the ENEM test in the year of your admission to BICE. Part A of Fig. 3 shows the percentage of students who attended Basic Education in a public school. The result of this analysis is very important, as it indicates that about 65% of them had their training taking place mostly in public schools, with only 15% of the students coming from private schools. These data are relevant because they indicate that the federal government's strategy of internalizing public universities, allied to the Quota system (for black students and/or public school students), transformed the reality of public higher education, making it cease to be elitist and making it more inclusive.

The relationship between the origin of Basic education (public and private) and ENEM grade is evidenced in part B of Fig. 3. It is possible to notice that the students who had the worst performances in the university entrance exam were those who had never studied in private schools. An interesting aspect concerns the group of students with more than 800 points in ENEM. It is noted that the best results in the ENEM test were not exclusive to those from the private school system, with a significant portion of students having had (at least) 50% of their training in public schools.

Fig. 4 analyses, for students from public schools, the relationship between the ENEM score and the perception, by these same

students, of their performance in mathematics during Basic Education. In this study, all those who studied less than 50% of the time in a private school were considered, regardless of whether this happened during elementary school or high school. It is noted that those who had a history of good performance, in general, had a good performance in the university entrance exam, with about 85% of them obtaining grades above 600 points. On the other hand, in the opposite group, that is, of the students who considered their performance in basic education to be regular, it was noted that almost 80% of them had ENEM scores below 600 points.

However, this same scenario is not repeated in relation to performance in Mathematics I at BICE. Fig. 5 shows that the proportion of students who performed well in Basic Education and passed the subject in the first semester at university is not significantly higher than for those who had a regular performance at school.

An interesting point to be highlighted in relation to Fig. 5 concerns the number of times the student had to take the course before being approved. It is noted that in the group of students who had the best results in Basic Education (grades A and B), the time to pass the subject was shorter than in the other groups (grades C and D) whose members, once failed, exhibited the tendency to have to take the course more than 2 times.

When asked about the reasons that triggered failures in Mathematics at the university, students pointed out as main reasons for dropping out of the discipline, difficulty with the teacher's content/didactics/assessments, and lack of basic knowledge in elementary mathematics (content that must have been in Basic Education). Fig. 6 displays the results of this question.

About 30% of public school students point to a lack of basic knowledge as a reason for

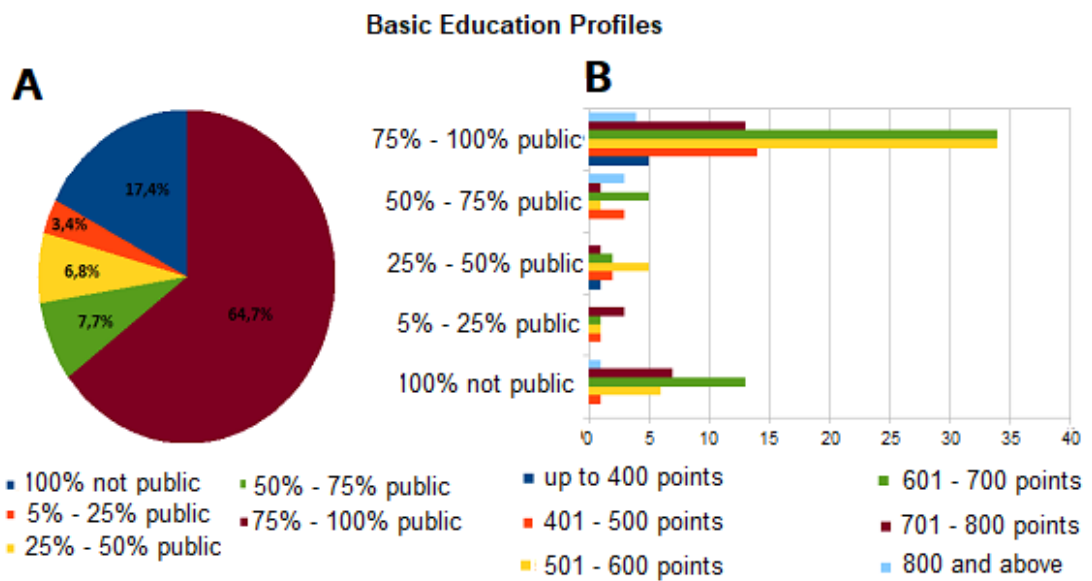


Fig. 3. A) Percentage of students who studied in public schools in high school. B) Mathematics grades in ENEM, depending on the type of Basic training. (Elaborated by the authors)

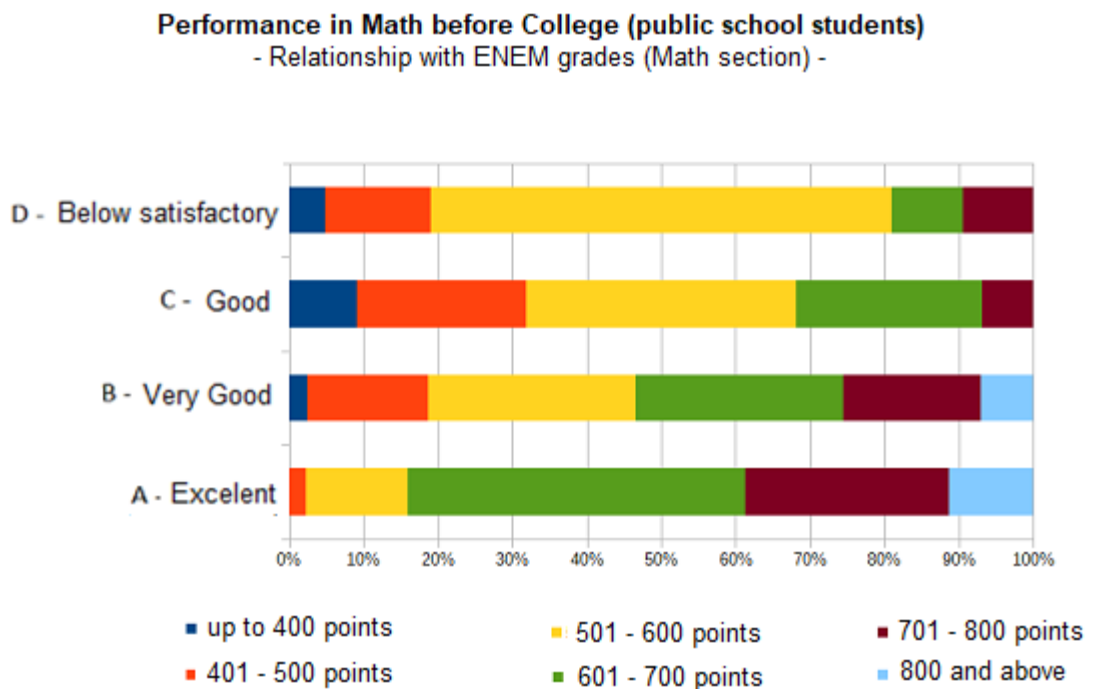


Fig. 4. Relationship between ENEM math grade and math performance in Basic Education, for public school students. (Elaborated by the authors).

Performance in Math before College (public school students)
- Relationship with Math I discipline performance -

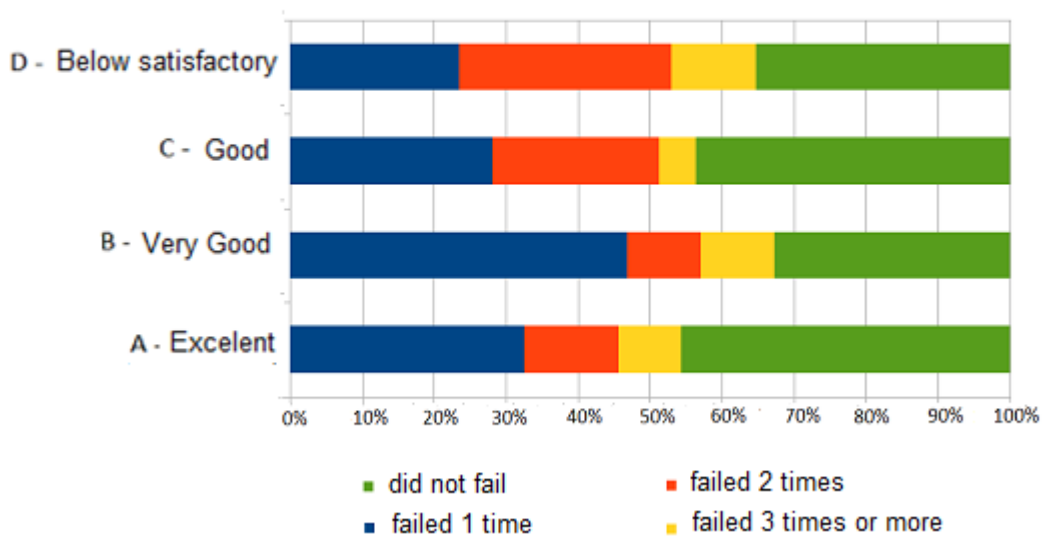


Fig. 5. Relationship between performance in Mathematics I at BICE and performance in Mathematics in Basic Education, for public school students. (Elaborated by the authors).

Performance in Math before College (public school students)
Relationship with the justification for failing in Math I discipline

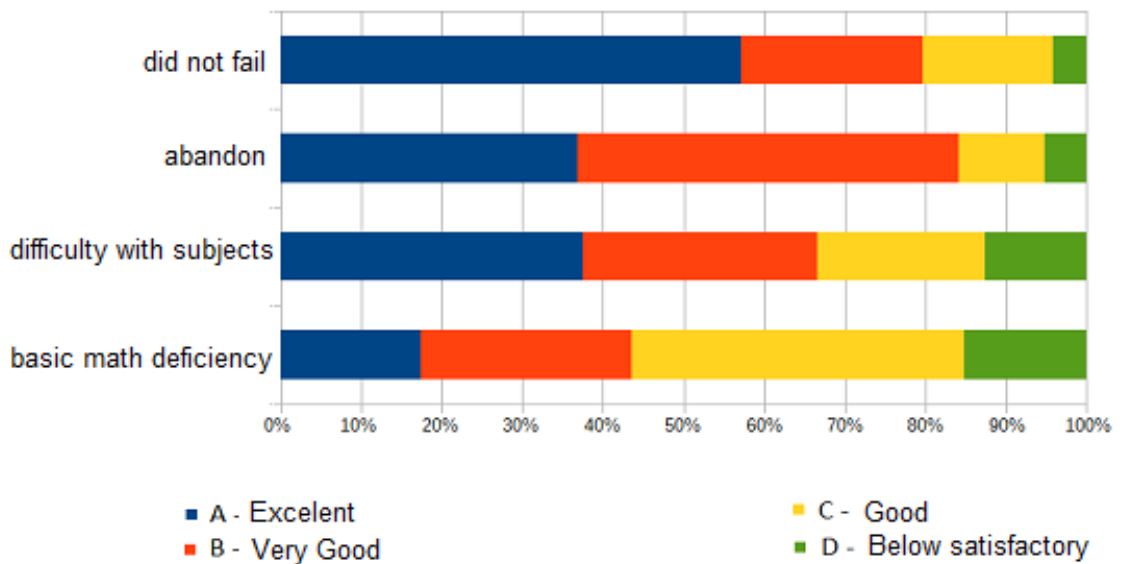


Fig. 6. Relationship between performance in mathematics in Basic Education and the reason/justification for their performance in Mathematics I at BICE, for public school students. (Elaborated by the authors).

failure in Mathematics I. Among students whose performance in Mathematics in Basic Education was already more timid (grades C and D), approximately 45% of them point to indicated that this was the main reason for the retentions. On the other hand, among those who performed well in Basic Education, only about 15% of them identify insufficient knowledge as responsible for your disapproval.

CONCLUSIONS

The objective of this work was, in the light of the information about the grade (in mathematics) of ENEM, and of the performance in the discipline of Mathematics I of the BICE, to evaluate the quality of the Basic (public) education in Brazil. To this end, information from the (voluntary) responses to questionnaires proposed to BICE academics was used.

From the data analysis, it was possible to conclude that an improvement in the quality of Basic (public) Brazilian education is necessary, since with the implementation of REUNI a greater share of students are in public higher education (nationally regarded as of excellence) aspiring to a good education and a good insertion in the job market and in the field of research/technology development.

In general, it can be seen that the performance (grade) of students (in mathematics) in ENEM is not radically different from learning (how much they know about the content) at school. However, in terms of performance (passing) in mathematics at school versus at university, the results indicate that there is a significant difference between these two realities. It is worth remembering that the justification, given by the students participating in the research, for the poor performance in Mathematics I was the lack of knowledge in elementary mathematics. Allied to this, Brazil occupies the last places in international education rankings,

which reinforces the suspicion that student performance in Mathematics I (at university) would be significantly better if the quality of education offered by public schools of Basic Education were increased.

The authors believe that, despite being more laborious and time-consuming, educational programs implemented in Basic Education schools must focus on learning and reasoning skills rather than exclusively aiming at approval.

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