Document of the Inter-American Development Bank

**Jamaica**

**Support for education Sector Reform III**

**(JA-L1033)**

**Economic Analysis**

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1. **Introduction**
   1. **Education Sector Transformation Program (ESTP).**In 2004, a high-level Taskforce on Educational Reform (TF) was appointed by the Prime Minister to prepare a plan to overcome persistent underachievement in student learning and to place Jamaica on the path of creating a world class education system. In 2005, the Education Transformation Team (ETT) was established to execute the recommendations of the 2004 TF report.The TF Report on Education Reform, 2004, identified obstacles for better student performance as described in the previous paragraph in the following areas: (i) Governance and management of the education sector; (ii) Teacher management; (iii) Curriculum and Assessment; and (iv) School Infrastructure.
   2. To accompany these efforts, the Bank and GOJ agreed on a programmatic policy-based operation consisting of three loans. The first operation (Loan 2074/OC-JA) approved and disbursed in December 2008 for US$30 million established the policy matrix and results indicators for the programmatic loan. Policy conditionality were identified for the three sequential operations in the three main areas of the ESTP to reflect (i) the initiation of policy changes for the education system for the first loan; (ii) advances in their implementation for the second; and (iii) the consolidation of policy actions for the third. The second operation (Loan 2301/OC-JA) approved in 2010 was a hybrid operation consistent in a Policy Based Loan (PBL) component of US$30 million (disbursed in 2010); and an investment component of US$15 million. The proposed third operation, for the amount of US$25 million will support the actions leading to the consolidation of the sector reform process.
   3. The actions set for the ESTP included: (i) establishment of the Department for School Services (DSS) to manage a more effective delivery of education through the decentralization of functions to the REAs; (ii) creation of the National Education Inspectorate (NEI) to evaluate school performance; (iii) creation of the Jamaica Teaching Council (JTC) in charge of raising the level of regulation, professionalism and quality of teaching; (v) establishment of the National College for Educational Leadership (NCEL) with the task to improve leadership and management at the school level through Board and Principals’ training and development; (vi) implementation of the National Literacy Strategy, the National Mathematics Strategy and the Lower Secondary Strategy as a means to improve the quality of primary and secondary education outcomes; (vii) establishment of an appraisal system for principals, guidance counselors and teachers to enhance accountability (using NEI information); (viii) infrastructure and facilities upgrades with non-traditional funding coming through the National Education Trust (NET); and (ix) improved stakeholder and community involvement in education.
   4. With this action plan in place, the first two programmatic loan supported the ESTP in the three main reform areas:
   5. **Governance and management of the sector.** With the **first programmatic loan**, a framework for the institutional reforms was created. The framework consisted of organizational structures for the main agencies; a definition of their missions and mandates and the role to be assumed in the reformed system; initial action plans containing information on required staffing, training to be provided, operational arrangements; and estimated costs. Where necessary, MOE obtained Cabinet approval for proposed changes in order to be able to advance with the reform efforts. MOE also conducted an analysis of the existing educational legislation (Education Act dating back to 1965) to ascertain which areas would need to be amended in light of the proposed reforms. For the **second programmatic loan** MOE advanced in the creation of the National Education Trust (NET), the piloting of two REAs, and the production of key operational guidelines and manuals for the JTC, and NEI
   6. **Curriculum, teaching and learning and school management.** For the ***first programmatic loan***, MOE put in place measures expected to contribute to improved student performance. In particular, MOE advanced in the design and subsequent implementation of measures intended to improve the quality of education through better teaching of numeracy and literacy[[1]](#footnote-1) at the primary level and by putting a support structure in place for low performing schools. It drafted a lower-secondary education strategy to better articulate between primary and secondary level; and in order to achieve more accountability in the system, MOE developed new instruments for the performance evaluation of principals, guidance counselors and teachers. In the area of curriculum & assessment, MOE completed an analysis of select curricula in secondary education with the aim to better align it with primary education and the standards of the exit exam at the end of grade 11. For the***second programmatic loan*,** MOE developed and tested the appraisal tool for principals, guidance counselors and teachers while simultaneously providing more support for improved teaching.
   7. **Relationship with communities and stakeholders and behavior modification.** Improved involvement of communities and parents in the education of their children has been a pillar of the transformation process. To this end, for the **first programmatic loan,** MOE supported the creation of a National Parent Teacher Association (NPTA) and executed a program of community consultation in two regions of the country to inform the general public about the planned initiatives. In addition, MOE conducted an internal social marketing campaign to inform MOE staff about the pending reform to create ownership and commitment among them. The outreach and involvement of stakeholders remains an important element of the reform. For the **second programmatic loan,** MOE established the National Parenting Policy and the Parenting Support Commission, developed a strategy on alternate behavior management and established a citizenship education program along with a newly developed value-based curriculum guide.
   8. The ESTP has made significant progress in shifting the central ministry to focus on policy and monitoring and evaluation functions, and in developing a managerial model characterized by decentralization of functions to the regions and outsourcing technical and operational functions to the new agencies. The NEI, JTC, NCEL and NET were all created since 2009 to take on specialized functions. The National Educational Inspectorate (NEI) has trained a pool of approximately 300 inspectors and completed around 954 school inspections (of 1,017 total) to provide baseline information regarding school performance. The JTC has done significant work in developing in-service teacher training opportunities and standards for teaching and is awaiting legislation approval to move forward with teacher licensing, which will improve the control of teacher qualifications. NCEL has trained five cohorts of school principals and education officers in leadership skills and is also supporting the numeracy program, offering math leadership training to principals, Heads of Department and Education Officers.
   9. As a consequence of these actions, students’ learning outcomes show steady progress. Results from the grade 4 literacy and numeracy assessment show a steady increase in the percentage of students achieving mastery. While in 2004 only 57% of 4th grade students’ mastered literacy, in 2014 the percentage rose to 77%. In numeracy, the percentage of students mastering the content rose from 38% in 2004 to 58% in 2014.
2. **Description of the Program**
   1. The third PBL of this Programmatic loan will continue to focus on the reform areas identified in the first loan including: (i) the implementation of institutional changes required for modernizing the Ministry of Education; (ii) increasing accountability and developing quality inputs (such as curriculum, teacher training, and assessment tools); and (iii) strengthening stakeholder involvement.
3. **Objectives of the Program**
   1. The objective of this program is to improve the learning outcomes of Jamaica’s students by: supporting the modernization of the MOE, increasing the effectiveness of the delivery of the education services, improving the standards and quality of education, raising the level of professionalism of the teaching profession, enhancing the accountability of the system and improving stakeholder and community involvement in education. The program’s direct beneficiaries are close to 630,000 students currently served by Jamaica’s education system as well as approximately 25,000 teachers it employs.
   2. The Programmatic Loan areas of consideration are three:
   3. **Reform Area I. Modernization of the Ministry of Education (MOE):**The objectives of this component are to transform the MOE into a policy ministry focused on policy formulation, quality assurance, monitoring and evaluation, standard setting and agency coordination, and to strengthen its operational capacity to support schools and monitor their accountability for improved results.
   4. **Reform Area II. Curriculum, teaching and learning and school management:** This reform area intends to improve the quality of education through the implementation of the National Literacy Strategy and the National Mathematics Strategy; enhance accountability of the system through the appraisal of principal, guidance counselors, and teachers; and improve the quality of teaching by supporting continuing education for teachers.
   5. **Reform Area III. Relationship with communities and stakeholders and behavior modification:** Improved relationships with communities and other stakeholders in the education sector, particularly parents, is an important pillar of the education transformation process. These efforts aim at informing and engaging the community and stakeholders and also improving behavior of youth. In this effort, MOE/ESTP continues to engage its major stakeholders with the expectation of eventually affecting behavior changes in students and also parents.
4. **Areas of this study**
   1. The Terms of References requested the following activities:
5. Conduct a General Economic Analysis for the PBL. The analysis should comply with the following criteria, following IADB guidelines:

* Develop the economic rationale behind the proposed policy reforms for the entire program.
* The economic rationale should be based on an economic model which should be presented and specified.
* The economic benefits – direct and indirect - that result from the implementation of the policy conditions included in the Policy Matrix for the entire program are adequately identified and for the most significant policy reforms, quantified.
* All relevant costs - direct and indirect - to economic agents that result from the implementation of the policy conditions included in the Policy Matrix for the entire program are adequately identified and quantified for the most significant policy reforms proposed.
* Assumptions used in the analysis are reasonable and clearly spelled out.
* Sensitivity analysis is performed and includes all key variables that could affect net benefits and assumptions.
* Sensitivity analysis is based on simulations from the economic model.

1. Support the project team in answering comments to the economic analysis received through the quality review process at the Bank.
2. **Methodology and Assumptions**
3. **Methodology**
   1. The economic analysis will be organized in three chapters. The first one will provide a brief overview of the methodology used for the economic analysis, the methodological limitations and the assumptions made in the study. In this chapter we will introduce the discount rate utilized and a justification for this decision will be provided.
   2. The methodology used for the Economic Analysis (EA) begins with the identification of all costs and all benefits attributed to the Program.
   3. **Costs.**Costs of education account for all incremental costs in education that are generated by the Program: infrastructure, teachers’ salaries as well as the private cost of education (direct and indirect costs). Given that the literature review has not shown any examples where shadow prices were applied to Jamaica, we assume that they have not been developed yet; therefore we decided to use market prices as a good proxy to evaluate inputs and the use of resources generated by the program.
   4. **Benefits**. All benefits are identified in accordance with the results matrix. However, it is not possible to quantify all of them and in those cases a review of the literature is presented. Synthetic Cohort Analysis will be used to determine the averted costs due to lowering repetition and dropout. Based on international literature on economic returns to investments in education, we estimate the benefits of the project, including improvements in the cognitive development of students and changes in lifetime earnings. The economic return will be subject to a sensitivity analysis, which will allow investigating the behavior of the model under different scenarios and with it, the strength of the results.
   5. The analysis contrastscostswith and without project, and the same procedure is used with benefits. The analysis is presented in a Bank report format, including detailed information on calculations;the present value (PV)calculation of both streams (costs and benefits) are reported;identification of beneficiaries are included; and a sensitivity analysis is presented.
4. **Assumptions**
   1. **Income**. The analysis considers the beneficiaries’salaries by level of education. The gain in efficiency was calculatedusinga Synthetic Cohort Analysis technique. The latter used information from the academic years 2012 and 2013. The exchange rate considered was JM$88.12/US$.

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| **Level of education** | Salary JM$ | Monthly US$ | Annual US$ |
| **None** | 7,205.47 | 81.77 | **981.23** |
| Incomplete primary ed. | 15,468.78 | 175.54 | 2,106.51 |
| **Complete primary ed.** | 15,862.94 | 180.02 | **2,160.18** |
| Incomplete secondary ed. | 17,200.17 | 195.19 | 2,342.28 |
| **Complete secondary ed.** | 35,801.50 | 406.28 | **4,875.37** |
| Source: LFS of Jamaica 2012 |  |  |  |

* 1. **Costs**. Direct and indirect costs,which result from the implementation of the policy reforms conditions included in the Policy Matrix, are identified for the entire program. For those items where relevant information is available they were quantified.
  2. Government Expenditure per primary student in Jamaica was taken from UNESCO and is US$1,229.3 for 2013. Other costs are reported in the Excel archive attached under the tag “data”.
  3. **Discount rate**: Although Governments do have to set priorities between investment in human capital and improvement in physical infrastructure, such decision is rarely made on the basis of rate of return comparisons. Another usual comparison is between education and other forms of human capital investment, which as the previous one is rarely made in practice. One reason is that in both cases it is difficult to measure indirect benefits and spillovers to society, so called externalities. The most common social discount rate (SDR) used for human capital investment is around 10 percent. The interpretation of this rate is based on the concept that the costs of an investment has to be incurred in the present in order to obtain income in the future, and the expectation of getting money in the future is worth less in the present than receiving a corresponding amount in the present. At the rate chosen, a sum invested at 10% will double itself in just over 7 years, this means that at this rate a dollar promised in 7 years is worth only half as much today. The higher the SDR, the lower is the present value of money expected at a future date.
  4. The assumed SDR can vary substantially among researchers and international organizations. Poverty Action Lab (JPAL-2011) assumes a discount rate of 5%, for example, while the Inter-American Development Bank recommends a rate of 15%. Whatever the standard applied we will perform a sensitivity analysis with a range of SDR that will allow comparing results with other studies.
  5. We will use a time span of 20 years and both, benefits and costs, will be discounted at a rate of 12%.

1. **Analysis of Costs**
2. **Reform Area I. Modernization of the Ministry of Education (MOE):**
   1. The objectives of this component are to transform the MOE into a policy ministry focused on policy formulation, quality assurance, monitoring and evaluation, standard setting and agency coordination, and to strengthen its operational capacity to support schools and monitor their accountability for improved results.
   2. The Costs associated with this Reform Area, are those incremental costs needed to generate those products that will constitutethe evidences of policies accomplishment for the third loan.
      1. ***For Results 2.Modernized Central Ministry of Education focusing on policy formulation, monitoring and evaluation, standard setting and agencies coordination***.The costsare mainly represented by the new staff required to make HR and the NET operational.Other costs necessary to make the NET operational, although not quantified in this study, were: contractual cost of experts to develop the Business Plan and the job descriptions of NET (considered in previous loan);EMIS designed and the actual connection of MOE with the regional offices;and all the consultations and drafting legislation for the JTC (previously done). Another cost that could have been quantified but happened in the second loan is the construction of 25 new schools that will be de-shifted during this loan. For the purpose of the Economic Analysis of the third PBL the cost of de shifting schools is not included.

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| **Product Indicator** | **After 3rd PBL** | **Means of verification** | **Estimated Costs US$/year** |
| Key HR positions filled | 3 | Letter from the PS indicating key positions | 3 x 8,937[[2]](#footnote-2) = 26,811 yearly |
| PPP manager for school construction recruited at NET | 1 | NET’s framework document, functional profile and business plan | 15,450[[3]](#footnote-3)  yearly |

* + 1. ***For Results 3.Effective delivery of education through decentralization of functions to the regions***. No additional costs are required to accomplish this result as all the activities are expected to be performed by the existing staff. These costs include:aligning education regions with parish boundaries; increasing the number of schools administered and supervised by REAs to 204; the same number of schools working with DSS in order to include NEI’s recommendations in the school improvement plan; completion of those school improvement plans in 80% of them; training regional staff in their new assignments; and establishment of 63 quality education circles to support all schools in improving performance.
    2. ***For Result 4. Improved standards and quality of the education system at all levels***.Seven activities will be performed with extra costs attributable to this loan, all the other deliverables are expected to be prepared by the MOE existing staff.

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| **Product Indicator** | **After 3rd PBL** | **Means of verification** | **Estimated Costs US$/year** |
| NEI core staff hired | 6 | PS letter and description of the 6 positions hired | 6\*15,450[[4]](#footnote-4) = 92,700 yearly |
| NEI Inspection handbook printed | 1 | Inspection handbook | 500\*30 = 15,000 |
| NEI inspectors for the evaluation of the education system trained | 300 | Letter from the PS stating the number of inspector trained. | 33,000[[5]](#footnote-5)+140[[6]](#footnote-6)\*300  = 75,000 only once |
| Schools with first cycle of inspections completed | 2,661 | NEI report and PS letter | 212,805 vehicle + per diem |
| Proficiency Pathways for primary education students operational | 1 | Handbook and charts of Proficiency Pathway program | 50,000 Handbook and charts production+ print |
| Method to identify children with special needs in place and operational and all children with special needs identified | 1 | Children with special needs report | 22,324 per-diem, transportation, local rent |

* 1. Other costs not quantified here because are expected to be completed by existing MOE staffs are the following: the creation of Guidelines for school self-evaluation; 954 schools completing their self-evaluation; and Program concept document for the Alternative Program for Exceptional Students (APEX).

1. **Reform Area II. Curriculum, teaching, learning and school management**
   1. A considerable group of youth either leaves primary or secondary schools without a formal certificate, with very low basic academic skills (language and mathematics) and also without the necessary life skills to succeed in their continuous education or in the world of work. The observed shortcomings in the basic and core skills of many young Jamaicans has made the modernization of the existing teacher-training-system become a priority issue.
   2. The improvement in teaching methodology with emphasis in core subjects at primary level of educationis expected to reduce repetition, and increase graduation rates. This will imply improving the pedagogical delivery of those courses, training teachers and principals; training teachers in remedial education; andtraining Principals and Head of Departments in leadership.
      1. ***Result 5. Raised level of professionalism and quality of teaching***.The mentorship training will be performed by JTC staff; the additional cost will be the workshop expenditures, estimated in US$140 per teacher, for 900 teachers.

Another cost is in-service teacher training program, assuming a 3 days training to all teachers in a period of two years. Training will be done by MOE staff and cost is related to materials, location and instruments rent.Finally, the development of the standards for teaching profession will be accomplished by MOE staff at no additional costs.

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| **Product Indicator** | **After 3rd PBL** | **Means of verification** | **Estimated Costs US$/year** |
| Number of mentors trained for the Teacher Mentorship Program | 900 | Mentoring program handbook | 140\*900=126,000  Only once. |
| In-service teacher training program under way | 1 | Report of in service teacher training program | 1,305,220 in two years of $652,610 each |
| % of teachers with BA degree | 62% | Letter from PS | 1,565,229 yearly |

* + 1. ***Result 6. Enhanced accountability of the system***. All the activities will be performed by MOE staff, specifically NCEL. For this Result, the expected costs are those related to report the performance appraisal documents regarding principals, guidance counselors and teachers. Costs for developing the appraisal instruments have been imputed to the first loan.
  1. As a condition for disbursement of this third operation, the National Comprehensive Literacy and Numeracy Program should be fully integrated into the national school curriculum. The outcome of this action is the improvement in the student’s performance in grade 4 literacy and numeracy tests. Following the Ministry of Education, the results obtained in 4th grade literacy test is determinant of whether or not students graduate from 6th grade. An increase of the proportion of student passing the 4th grade test in literacy denotes an equal proportion of students graduating from primary school. This implies some benefits and some costs. The costs are represented by the opportunity cost of two extra years of schooling for those students that without the program would not pass the test and would drop-out school. Another cost attributable to the improvement in the proportion of passing students is the increase in government expenditure for having those students two more years in the system.
  2. The proportion of extra students passing 4th grade exam as consequence of the literacy program, is expected to be 8% in two years, 4% per year. Since the teachers will be trained in two years (year 1 and 2), half the students will start the two-year program the second year (years 2 and 3) and half the third year (years 3 and 4). The number of students in 4th grade is 46,070 therefore for year 2, we will have for half of them a 4% increase: 921 students. For year 3 will be double this amount: 1,843 students and for year 4, again 921 students. The profit foregone of staying at school is the average of the salary of a person without education and those with incomplete primary (1,543.87). Therefore, the private cost is for **year 2: US$1,422,522; for year 3: US$2,845,044; and for year 4: US$1,422,522.**
  3. Following the same logic, the cost for the Government of extra students in the system will be the number of extra students (921; 1,843; and 921) times the cost per primary student (US$1,229.3), giving the following costs: **year 2: US$1,132,677; year 3: US$2,265,354; and for year 4: US$1,132,677.**

1. **Reform Area III. Relationship with communities and stakeholders and behavior modification**

a. ***Result 7. Improved stakeholder and community involvement in education***. Two products were costed because they imply a budget increase attributable to the activities carried out to satisfy these results.

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| **Product Indicator** | **After 3rd PBL** | **Means of verification** | **Estimated Costs US$/year** |
| Parents mentors trained by NPSC to reach out to parents in the community | 70 | Report on parents mentor program | 140\*70=9,800  Only once. |
| Newsletter distributed to all staff and schools and regular TV and radio broadcasts | Yearly | Letter from the PS | Estimated in US$30,000 |

* 1. Some other activities are mentioned in the Result Matrix such as having a National Parenting Support Commission (NPSC) operational; and School Wide Program for Behavior in School (SWPBIS) implemented. These are not supposed to imply significant additional costs.

**TOTAL QUANTIFIABLE COSTS PER YEAR**

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| **Product Indicator** | **2016** | **2017** | **2018** | **2019** | **2020** | **…** | **2035** | **2036** |
| Key HR positions filled | 26,811 | 26,811 | 26,811 | 26,811 | 26,811 | **…** | 26,811 | 26,811 |
| PPP manager for school construction recruited at NET | 15,450 | 15,450 | 15,450 | 15,450 | 15,450 | **…** | 15,450 | 15,450 |
| NEI core staff hired | 92,700 | 92,700 | 92,700 | 92,700 | 92,700 | **…** | 92,700 | 92,700 |
| NEI Inspection Handbook printed | 15,000 |  |  |  |  |  |  |  |
| NEI inspectors for the evaluation of the educ. system trained | 75,000 |  |  |  |  |  |  |  |
| Schools with first cycle of inspections completed | 212,805 |  |  |  |  |  |  |  |
| Proficiency Pathways for primary education operational | 50,000 |  |  |  |  |  |  |  |
| Method to identify children with special needs in place and operational and all children with special needs identified | 152,374 |  |  |  |  |  |  |  |
| Number of mentors trained for the Teacher Mentorship Program | 126,000 |  |  |  |  |  |  |  |
| In-service teacher training program under way | 652,610 | 652,610 |  |  |  |  |  |  |
| Differential Cost of 62% of teachers with BA degree | 0 | 0 | 782,614 | 1,565,229 | 1,565,229 | **…** | 1,565,229 | 1,565,229 |
| Private cost of two more years of school | 0 | 1,422,522 | 2,845,044 | 1,422,522 | 0 |  |  |  |
| Government cost of two more years of school | 0 | 1,132,677 | 2,265,354 | 1,132,677 | 0 |  |  |  |
| Parents mentors trained by NPSC to reach out to parents in the community | 9,800 |  |  |  |  |  |  |  |
| Newsletter distributed to all staff and schools and regular TV and radio broadcasts | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | **…** | 30,000 | 30,000 |
| **TOTAL** | **1,458,550** | **3,372,770** | **6,057,973** | **4,285,389** | **1,730,190** | **…** | **1,730,190** | **1,730,190** |

**NPV(12%)= $18,694,780**

1. **Analysis of Benefits**
   1. As it was previously explained the objective of this program is to improve the learning outcomes of Jamaica’s students by: supporting the modernization of the Ministry of Education; increasing the effectiveness of the delivery of the education services; improving the standards and quality of education; raising the level of professionalism of the teaching profession; enhancing the accountability of the system; and improving stakeholder and community involvement in education. If all these actions are accomplished and the main objective is reached, it would have a positive effect on the internal efficiency of the system. The Results Matrix conveys the same message, all the actions are targeted to improve the learning outcomes, and therefore “***Results 1: Improved student’s learning***” in the Matrix summarizes the outcome of all the other actions, being this the main outcome of the project.
   2. To measure this benefit we use the number of students enrolled by grade and number of repeaters by grade for a couple of consecutive academic years (2012 and 2013).We use this indicator, assuming that students that improve their performance in national tests are less likely to repeat and dropout of school. The transition rates were calculated as well as a synthetic cohort analysis was performed.
   3. Each of the indicators conforming “Results 1” in the Results Matrix, show an improvementin the value of about 20 percentage points in their attainments in math and language, as well as GSTAT and CSEC 1-3 in 5 subjects including language and math. These, translates in a range between 52.6% increase in value to 36.8% increase. We took a conservative overall value of 30% increase in performance by reducing in this percentage the annual number of repeaters, while keeping constant the number of dropouts:

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| **Analysis of a Synthetic cohort without and with program: 30% decrease in the number of repeaters** | | |
|  | **Without** | **With** |
| 1. Entrants in Grade 1 | 1,000 | 1,000 |
| 1. Promoted to Grade 7th/ proxy for graduates | 784 | 790 |
| 1. Promoted to Grade 6 without repeating | 655 | 677 |
| 1. Total dropouts | 216 | 209 |
| 1. Total student-year | 5,730 | 5,730 |
| 1. Student-years for those that are promoted to Grade 7th | 4,850 | 4,869 |
| 1. Average # of years needed to complete school those reaching 7th | 6.19 | 6.16 |
| 1. Average number of years attended by dropouts | 4.08 | 4.11 |
| 1. Total # of student-years required to produce one promote to 7th | **7.31** | **7.25** |
| 1. Input / output ratio (measure of wastage) | 1.2181 | 1.2081 |
| 1. Percent of entrants that are promoted to Grade 7th | 78.41% | 79.05% |

* 1. Considering the efficiency differential between the original information and the reduction on repeaters by 30%, offers a decreased in the number of students-years required to produce a promote to 7th grade between the “without” and “with” program of 7.31 to 7.25 student years, it is a 0.06 years decrease per student to graduate.The cost of one year of primary schooling is estimated at US$1,229.3, there is a saving of US$73.76 per year per student graduated. The number of graduates under the program was calculated multiplying the students enrolled in 1st Grade (45,959) times the percentage of entrants that are promoted to Grade 7th under the program (79.05% in Table 1.1) giving 36,331 students/year, this number times the saving per student explained above, yields a **total of US$2,679,952 saved per year.**
  2. There is still another benefit for society from the reduction on the number of repeaters, and is an increase in the number of graduates per year calculated by multiplying the entrants in 1st Grade(45,959) times percentage increase in graduation (79.05%‑78.41%)/ 78.41% = 0.82%). That calculation yields 377 students per year. But, most of them (96%) pass to secondary level, therefore the number that stay at primary level salary are (377-355from next paragraph = 22). That multiplied times the difference between a primary graduate minus the average salary between none school and primary school dropout (US$2,160.18 – (US$981.23 + 2106.51)/2 = US$616.31) renders a **total gain of US$13,600 per year and per cohort** until the end of the 20 years period.
  3. From those extra studentsgraduated from primary (377)only pass to secondary level 96% (362 students). From those students only finish secondary 98.1% leaving 355 students. Those will increase their earnings from the average of none education and incomplete primary (US$1,543.87) to a complete secondary level US$4,875.37, being the difference of US$3,331.5 per year. This amount multiplied times the number of extra graduates (355) gives the benefit to society of **US$1,182,567** from year 2025 until the end of the time spam of this project in year 2035.

**Total Benefits**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Product Indicator** | **2019** | **2020** | **…** | **2025** | **2026** | **…** | **2034** | **2035** |
| Improved Efficiency | 2,676,775 | 2,676,775 | … | 2,676,775 | 2,676,775 | **…** | 2,676,775 | 2,676,775 |
| Benefit to Society 1stCoh. | 13,600 | 13,600 | … | 13,600 | 13,600 | **…** | 13,600 | 13,600 |
| Benefit to Society 2ndCoh. | 0 | 13,600 | … | 13,600 | 13,600 | **…** | 13,600 | 13,600 |
| … | … | … | … | … | … | **…** | … | … |
| Benefit to Society 7th C | 0 | 0 | 0 | 1,182,567 | 1,182, 567 | **…** | 1,182, 567 | 1,182, 567 |
| Benefit to Society 8th C | 0 | 0 | 0 | 0 | 1,182, 567 | **…** | 1,182, 567 | 1,182, 567 |
| … | … | … | … | … | … | **…** | … | … |
| Benefit to Society 16th C | 0 | 0 | 0 | 0 | 0 | **…** | 1,182, 567 | 1,182, 567 |
| Benefit to Society 17th C | 0 | 0 | 0 | 0 | 0 | **…** | 0 | 1,182, 567 |
| **TOTAL** | **2,693,552** | **2,707,152** | **…** | **3,944,120** | **5,126,687** | **…** | **14,587,226** | **15,769,794** |

**NPV= $26,277,230**

* 1. In terms of ***Result 3: Effective delivery of education through decentralization of functions to the regions***. This practice has resulted in better performance in many countries. Decentralization reforms have been introduced since the 80’s in different parts of the developed and developing world as a way to increase autonomy and accountability at the local level and ensure that schools respond to local priorities and values.[[7]](#footnote-7) Finland decreased its central steering and increased the local administration’s decision-making at all levels of education which helped increase client satisfaction and improved educational outcomes overall.[[8]](#footnote-8) Education systems in Ontario and Massachusetts also have local education management units that are in charge of the administrative and academic management of groups of schools and the central Ministry interacts with schools through these intermediary structures. Overall, the evidence suggests that decentralization policies: (i) do change the dynamics of the school, mobilizing parents and teachers to get more involved; (ii) have a positive impact in reducing repetition rates, failure rates and to a lesser degree, dropout rates; and (iii) have a positive association to student outcomes in some countries (El Salvador, Kenya, Mexico and Nicaragua).As we can see, decentralization also supports the reduction in repeaters and drop-out.
  2. In terms of ***Result 5: raising the level of professionalism and quality of teaching***. Studies from high performing education systems show that they all, not only have implemented institutional reforms that affect the roles and responsibilities of education management units at different levels, but also have set well-designed and connected teaching and learning elements to support students in their learning. Countries such as Finland, Ireland, Netherlands, South Korea and Singapore have moved from a rigid common curriculum to a more flexible one and maintained a strong focus on improving teaching because of its direct impact upon student achievement.[[9]](#footnote-9) Despite different cultural and political contexts, to improve teaching these countries have consistently done three things well: (i) get the right people to become teachers; (ii) develop those people into effective instructors; and (iii) put in place systems and targeted support to ensure that every child is able to benefit from excellent instruction.[[10]](#footnote-10)As a corollary, these studies demonstrate that raising the level of professionalism and quality of teaching has direct impact upon students’ achievements and this translates in lowering the number of repeaters.
  3. In terms of ***Result 6. Enhanced accountability of the system***. High performing countries have all placed mechanisms to ensure that there is enough student data to inform teaching and policy. This data is geared towards identifying improvement needs in the system and target support to those schools that need it the most[[11]](#footnote-11). Hong Kong, England and New Zealand have created independent inspectorates to assess schools’ quality. Schools which perform poorly are subject to more intensive scrutiny and more frequent reviews until performance improves. In a more indirect way, improving the information system, helps improve school performance and with this the school internal efficiency.
  4. Lastly, in terms of ***Result 7: Improved stakeholder and community involvement in education*.** The literature shows that involvement of all stakeholders is necessary to shape and implement reforms. Research shows that active parent/family involvement in their children’s education and in their schools has a significant benefit for the students. When schools, families and communities work together, children tend to do better in school, stay in school longer, like school more and schools do better.[[12]](#footnote-12) Ireland’s Home, School, Community Liaison developed a scheme where parental involvement, especially in the areas of economic deprivation, not only benefits the children and school, but also is crucial for lifelong learning. As a result, teachers have reported improved performance by students in class, better attendance, and higher expectations.

1. **Sensitivity Analysis**
   1. The sensitivity analysis of the project is a recalculation after changes in key variables that affect project costs, benefits, and assumptions. All relevant variables are specified and the NPV calculations, resulting from changes in these variables, follow.
   2. The sensitivity analysis implies a lower project impact on the internal efficiency of the education system. We are interested to know what if the reduction in the number of repeaters goes from 30% to 20%. The cohort analysis yields the following results:

|  |  |  |
| --- | --- | --- |
| **Analysis of a Synthetic cohort without and with program: 20% decrease in the number of repeaters.** | | |
|  | **Without** | **With** |
| 1. Entrants in Grade 1 | 1,000 | 1,000 |
| 1. Promoted to Grade 7th/ proxy for graduates | 784 | 790 |
| 1. Promoted to Grade 6 without repeating | 655 | 671 |
| 1. Total dropouts | 216 | 210 |
| 1. Total student-year | 5,730 | 5,736 |
| 1. Student-years for those that are promoted to Grade 7th | 4,850 | 4,871 |
| 1. Average # of years needed to complete school those reaching 7th | 6.19 | 6.17 |
| 1. Average number of years attended by dropouts | 4.08 | 4.11 |
| 1. Total # of student-years required to produce one promote to 7th | **7.31** | **7.26** |
| 1. Input / output ratio (measure of wastage) | 1.2181 | 1.2105 |
| 1. Percent of entrants that are promoted to Grade 7th | 78.41% | 78.97% |

* 1. We do the same calculations as in the previous case.Considering the efficiency differential between the original information and the reduction on repeaters by 20%, offers a decreased in the number of students-years required to produce a promotee to 7th grade between the “without” and “with” program of 7.31 to 7.26 student years respectively, it is a 0.0455 years decrease per student to graduate. The cost of one year of primary schooling is estimated at US$1,229.3, there is a saving of US$55.93 per year per student graduated. The number of graduates under the program was calculated multiplying the students enrolled in 1st Grade (45,959) times the percentage of entrants that are promoted to Grade 7th under the program (78.97% in Table 1.2) giving 36,294 students/year, this number times the saving per student explained above, yields a **total of US$2,033,429 saved per year.**
  2. As explained before, there is still another benefit for society from the reduction on the number of repeaters, and is an increase in the number of graduates per year calculated by multiplying the entrants in 1st Grade (45,959) times the percentage increase in graduation ((78.97% -78.41%)/ 78.41% = 0.72%). That calculation yields 332 students per year. But, most of them (96%) pass to secondary level, therefore the number that stay at primary level salary are (332-312 from next paragraph = 20). That multiplied times the difference between a primary graduate minus the average salary between none school and primary school dropout (US$2,160.18 ‑ (US$981.23 + 2106.51)/2 = US$616.31) renders a **total gain of US$11,962 per year and per cohort** until the end of the 20 years period
  3. From those extra students graduated from primary (332) only pass to secondary level 96% (318 students). Those students in turn only finish secondary 98.07% leaving 312 students. Those will increase their earnings from the average of none education and incomplete primary (US$1,543.87) to a complete secondary level US$4,875.37, being the difference of US$3,331.5 per year. This amount multiplied times the number of extra graduates (312) gives the benefit to society of **US$1,040,144** from year 2025 until the end of the time spam of this project in year 2035.

**Total Benefits – Sensitivity Analysis**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Product Indicator** | **2019** | **2020** | **…** | **2025** | **2026** | **…** | **2034** | **2035** |
| Improved Efficiency | 2,033,249 | 2,033,249 | … | 2,033,249 | 2,033,249 | **…** | 2,033,249 | 2,033,249 |
| Benefit to Society 1stCoh. | 11,962 | 11,962 | … | 11,962 | 11,962 | **…** | 11,962 | 11,962 |
| Benefit to Society 2ndCoh. | 0 | 11,962 | … | 11,962 | 11,962 | **…** | 11,962 | 11,962 |
| Benefit to Society 7th C | 0 | 0 | 0 | 1,040,144 | 1,040,144 | **…** | 1,040,144 | 1,040,144 |
| Benefit to Society 8th C | 0 | 0 | 0 | 0 | 1,040,144 | **…** | 1,040,144 | 1,040,144 |
| … | … | … | … | … | … | **…** | … | … |
| Benefit to Society 16th C | 0 | 0 | 0 | 0 | 0 | **…** | 1,040,144 | 1,040,144 |
| Benefit to Society 17th C | 0 | 0 | 0 | 0 | 0 | **…** | 0 | 1,040,144 |
| **TOTAL** | **2,045,391** | **2,057,354** | **…** | **3,145,346** | **4,185,490** | **…** | **12,506,640** | **13,546,784** |

**NPV = US$21,471,816**

* 1. Besides, this study has introduced a sensitivity analysis on the discount rate used. The reason is that costs are mainly incurred in the first few years, while benefits grow stronger with time. This implies that a higher discount rate will affect more benefits than costs. The following table shows the variations in the present value using 12%, 15% and 18% discount rates.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **NPV(12%)** | **NPV(15%)** | **NPV(18%)** |
| Total Costs | US$18,694,780 | US$16,142,180 | US$14,162,705 |
| Total Benefits - 30% reduction repeaters | US$26,277,230 | US$19,071,716 | US$14,191,080 |
| Total Benefits - 20% reduction repeaters | US$21,471,816 | US$15,487,490 | US$11,452,901 |

* 1. For Benefits of 30% reduction in repeaters, the discounts rates of 12% to 18% make the present values of Benefits bigger than Costs. Only at 12% the PV of Benefits produced by a reduction of 20% in the number of repeaters is above the PV of costs at the same rate.

1. **Conclusions of the Economic Analysis**
   1. The present study reports the Economic Analysis of the Project: Support for Education Sector Reform III, Operation JA-L1033. These conclusions present the main results and provides a clear recommendation to the Bank about financing the operation
   2. The analysis describes those**Costs** associated with the three Reform Areas and quantifies the value of the most important costs. In this study we only report those incremental costs that need to be incurred to generate those products considered evidences of a successful execution of the third loan.
   3. Incremental costs are reported for 14 indicators, distributed in about two indicators per each of the seven Results in which the Project divided the Reform Areas. Costs were reported per year in the 20 years life spam of the loan. Many of the activities,necessary to evaluate the indicators in the Result Matrix, will be performed by the existing work force, especially the Ministry of Education; in those cases no cost is attributed to the project.
   4. Most of the costs are incurred in the second to the fourth year of twenty; the stream of expenditures are given below:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Years** | **2016** | **2017** | **2018** | **2019** | **2020** | **2034** | **2035** |
| **TOTAL COSTS** | **1,458,550** | **3,372,770** | **6,057,973** | **4,285,389** | **1,730,190** | **1,730,190** | **1,730,190** |

* 1. The Net Present Value of this stream of costs discounted at a rate of 12% in a period of 20 years gives the following result: NPV(12%) = **$18,694,780.**
  2. Regarding **Benefits**, the first one accounted for is the savings rendered by improvingsystem’s internal efficiency. The gain inefficiency expressed as a fraction of the year times the costof a student per year times the number of students finishing 6th grade, gives a total saving per year of **US$2,679,952.**
  3. Another important benefit accounted for is the benefit to the society for having more graduates per year. A small proportion of these primary graduates will go to the labor force but most of them will go to secondary education. The amount gained in the first five years after primary graduation comes from those additional students that after graduation from primary go to the labor market and increment earnings in a total of **US$13,600**. A proportion of those who continue will finish secondary education and assuming that after completion they will go to the labor market increasingtheir collective income in **US$1,182,567** per year after year 2025. The stream of income related with these items are as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Years** | **2016** | **2019** | **2020** | **2025** | **2034** | **2035** |
| **TOTAL BENEFITS** | **0** | **2,693,552** | **2,707,152** | **3,944,120** | **14,587,226** | **15,769,794** |

* 1. The Net Present Value of Benefits at a discount rate of 12% yields for a benefit stream of 20 years: NPV(12%) = **US$26,277,230**.
  2. It is important to insist that all the activities accounted for when we described the costs, are assumed to contribute to the improvement of education outcomes, represented here by a gain in internal efficiency. In addition, all other benefits have been identified and backed up with the relevant literature.
  3. We have relaxed the reductionin the number of repeaters by grade from 30% decrease to a 20% decrease,bearing a Net Present Value of Benefits NPV(12%) = US$21,471,816whichis a goodreturn considering thatbeyond these identified and quantified benefits, there are several others which has been only identified in this work and are backed up by the literature review. It is possible, although beyond the scope of this work, to quantify those benefits, which will add to this number making the project even more profitable.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Years** | **2016** | **2019** | **2020** | **2025** | **2034** | **2035** |
| **TOTAL BENEFITS** | **0** | **2,045,391** | **2,057,354** | **3,145,346** | **12,506,640** | **13,546,784** |

* 1. The Net Present Value of Benefits at a discount rate of 12% yields for a benefit stream of 20 years: NPV(12%) = **US$21,471,816**
  2. This analysis shows that the evaluated project is of low risk and has some margin for changes without affecting much the outcomes. Benefits can grow even more if we consider that those students finishing primary and go in a certain percentage to secondary, could even go to higher education, increasing even more the benefits to society.
  3. Given the results obtained in this analysis we could safely say that the project is competitive and that investing in these areas of education is profitable.

1. Some of these initiatives, such as provision of new and updated curricula and assessments at both the primary and secondary level were, in part, initiated with previous education projects (e.g., Loan 1264/OC-JA). [↑](#footnote-ref-1)
2. Source LFS of Jamaica.Secondary Education Teaching Professional. [↑](#footnote-ref-2)
3. Source LFS off Jamaica. College, university and higher education teaching professionals [↑](#footnote-ref-3)
4. Source LFS of Jamaica.College, university and higher education teaching professionals. [↑](#footnote-ref-4)
5. Source MOE, Jamaica. Contract for one year to train the inspectors [↑](#footnote-ref-5)
6. Workshop and training materials per trainee. [↑](#footnote-ref-6)
7. [Education Management and Leadership: A rapid review of literature](http://www.oise.utoronto.ca/cidec/UserFiles/File/Website/Rapid_Review_Education_Management_and_Leadership_june_30_final.pdf) [↑](#footnote-ref-7)
8. [Education Reform in Jamaica: Recommendations from Ireland, Finland and Singapore](http://www.psoj.org/files/Education%20Reform%20Report.pdf). [↑](#footnote-ref-8)
9. Darling-Hammond, L. (2010). “Steady Work: How Countries Build Successful Systems.” In Darling-Hammond, L. (2010).*The Flat World and Education: How America’s Commitment to Equity Will Determine Our Future*. New York, NY: Teachers College. [↑](#footnote-ref-9)
10. [How the world’s best-performing school systems come out on top](http://www.smhc-cpre.org/wp-content/uploads/2008/07/how-the-worlds-best-performing-school-systems-come-out-on-top-sept-072.pdf) [↑](#footnote-ref-10)
11. Darling-Hammond, L. & Wentworth, L. (2010).*Benchmarking learning systems: student performance in international context*. Stanford, CA: Stanford University. [↑](#footnote-ref-11)
12. [Engaging parents and stakeholders in school wellness](http://www.californiaprojectlean.org/docuserfiles/Parent%20Formative%20Research%20Report.pdf) [↑](#footnote-ref-12)