

ECONOMIC ANALYSIS

A. Rationale

1. **Country context.** While the Kyrgyz Republic has a legacy of high literacy, cognitive skills are declining: only 44.2% of tested pupils passed a national reading literacy test in 2005 compared with 59.1% in 2001, and pass rates in math fell from 81.4% to 58.8% in that period.¹ The country ranked last in both mathematics and literacy in the Program for International Student Assessment (PISA) test in 2006 and 2009. An evaluation of the 2009 PISA results found that a shortage of teachers and textbooks and inadequate infrastructure were among the main contributors to the poor standings.²

2. Efforts to reform the education system are evident in the resources committed to education by the government. However, these efforts have been severely hampered in the period from 2008 to 2011 by a series of political and economic shocks that caused the gross domestic product (GDP) to contract while government expenditures grew. Despite the negative economic shocks, the government increased budget allocations to education from 5.9% of GDP in 2008 to 6.9% of GDP in 2012.

3. **Government policy context.** The government has established an overall objective for the education sector to ensure competitiveness and economic prosperity of the country, as well as add value and improve the quality of human capital. Preschool and secondary education are identified as priorities.³ The government's Education Development Strategy (EDS) 2012–2020 identifies the following priorities related directly to the proposed project outputs: (i) modern competency-based curricula, (ii) individual approach to teaching, (iii) inclusive education, (iv) adequate textbook supply, (v) diagnosis and monitoring of results, and (vi) reform of in-service teacher training (INSETT).

4. Since 2009, reforms have included (i) drafting curricula for grades 1–4, (ii) introducing per capita financing of schools to improve equity, (iii) increasing teacher salaries, and (v) initiating school boards of trustees to enhance community engagement in school management.

5. **Challenges.** Enhanced quality of secondary education is correlated with economic development and increased productivity and poverty reduction. Policy and investment support is critical to carry out the reforms envisioned in EDS 2012-2020. INSETT needs improvement to ensure that it incorporates new teaching methodologies and learning assessment systems. The 2011 increases in teacher remuneration has largely alleviated teacher shortages, although there is still a shortage of qualified teachers in the sciences, as well as a lack of sufficient laboratories, teaching aids, and materials for teaching natural sciences.⁴ The curricula are being updated, starting with work on earlier grades supported by the Asian Development Bank (ADB) and partner agencies. New curricula are needed for lower and upper secondary grades. Updating of the curricula must be supported by a sustainable funding mechanism to pay for textbooks.

¹ D. Lewis. 2011. *Drivers of Change in Kyrgyzstan*. London: Department for International Development.

² Government of the Kyrgyz Republic, Ministry of Education and Science. 2012. *Education Development Strategy of the Kyrgyz Republic 2012–2020*. Bishkek.

³ National Council for Sustainable Development of the Kyrgyz Republic. *National Sustainable Development Strategy for the Kyrgyz Republic for the Period of 2013–2017*. Bishkek.

⁴ National Statistical Committee. 2012. *Education and Science in the Kyrgyz Republic: Statistical Digest*. Bishkek.

B. Least Cost Analysis

6. Where appropriate, least-cost analysis (LCA) of project activities was completed to determine whether project designs are efficient. Some project activities involve policy studies concerning topics such as the approach to curriculum review and the design of a textbook rental scheme. These were not subject to LCA.

7. Many project activities directly or indirectly concern in-service training for teachers, principals, deputy principals, and various specialists. LCA for these activities considered three approaches to training: (i) centralized face-to-face training costing \$50 per trainee day; (ii) decentralized face-to-face training costing \$35 per trainee day; and (iii) online training, which is currently not feasible. Where trainee numbers permit, decentralized face-to-face training will be used. A small number of trainees require centralized face-to-face training. Proposed investments in ICT equipment will facilitate online training, which is the least-cost option in the long run.

8. Proposed expenditures on civil works and equipment (information and communication technologies and science laboratories) cannot be subjected to LCA at this stage since needs assessments will only be completed, and design specifications developed, once innovative schools are selected and science curricula are drafted. The proposed tendering process for procurement is used to achieve least-cost outcomes for these activities.

C. Benefit–Cost Analysis

9. **Price conversion factors.** The shadow exchange rate factor (SERF) was estimated to be 1.014. Price conversion factors were estimated for all cost categories based on the SERF, and the proportion of costs within each category that were considered to be tradable.⁵ Price conversion factors also adjust costs to net out transfers related to taxes. Details of the underlying calculations are provided in the full economic analysis.

10. **Benefits.** Project investments will (i) help establish a more effective and efficient curriculum for secondary education, (ii) train teachers in that curriculum, and (iii) increase the supply of textbooks. Complementary investments in selected innovative schools will improve the learning environment in those schools and support teacher training and the dissemination of the new curriculum. Economic benefits come from the improvement in cognitive skills of students leading to higher productivity, higher wage premium for secondary school completers (relative to non-completers), and decreased wastage of public and private resources as a result of reduced dropouts and repetitions.

11. Benefits are both monetary and nonmonetary. The monetary benefits include conditional increases in private earnings, and these are the focus of the benefit–cost analysis. Private nonmonetary benefits include improved health of self and other family members, improved planning of family size, and more efficient consumption decisions. Public nonmonetary benefits include lower crime rates, higher social cohesion, and more rapid adoption of technological change.⁶ These additional project benefits are recognized but are difficult to quantify.

12. **Beneficiaries.** Direct project beneficiaries include students, parents, and teachers. Table 1 lists the program or reform benefits and direct beneficiaries.

⁵ This varied from 100% for various equipment cost categories to 10% for civil works.

⁶ C. Harmon. 2011. *Economic Returns to Education: What We Know, What We Don't Know, and Where We Are Going – Some Brief Pointers*. IZA Policy Paper No. 29. Bonn: Institute for the Study of Labor.

Table 1: Project Beneficiaries

Outputs	Beneficiaries
Output 1: Curriculum and learning and teaching materials improved	
A financially sustainable textbook provision mechanism. Textbook curriculum writers, authors, and publishers trained. Reduced time for the development and piloting of curricula and LTMs.	Direct beneficiaries – All primary and secondary school students: 1.25 million in 2014 growing to 1.58 million by 2034 Indirect beneficiaries – General population
Detailed subject curricula for general and specialized tracks for grades 10–11 developed and approved.	Direct beneficiaries – grade 10 and 11 students: 0.20 million in 2014 growing to 0.25 million by 2034 Indirect beneficiaries – General population
LTMs for priority subjects for grades 7–9 developed, piloted, and printed following the approved manuscript evaluation guidelines.	Direct beneficiaries – grade 7–9 students: 0.33 million in 2014 growing to 0.40 million by 2034. Removal of gender bias will benefit both sexes Indirect beneficiaries – General population
Output 2: Quality of teachers and teacher training improved	
Training completed for core trainers on the new curriculum. New teacher professional certificates (attestation) obtained by 30% of secondary school teachers.	Direct beneficiaries – All primary and secondary school teachers, numbering 75,500 ^a Indirect beneficiaries – all students: 1.25 million in 2014 growing to 1.58 million by 2034
In-service teacher training modified to become flexible. Online modules for in-service training piloted in innovative schools.	Direct beneficiaries – Primary and secondary school teachers numbering 75,500 ^a especially those in more remote oblasts Indirect beneficiaries – all students: 1.25 million in 2014 growing to 1.58 million by 2034
10,000 teachers trained on new curriculum and textbook used. About 1,000 principals and deputy principals trained.	Direct beneficiaries – 10,000 teachers and others who are trained. Indirect beneficiaries – all primary and secondary school teachers numbering 75,500 ^a
Output 3: Access to quality education through innovative schools improved	
All teachers in innovative schools trained in the use of sciences kits, learning materials, and multimedia classrooms. Functional board of trustees established in innovative schools. Minor rehabilitation in 30 innovative schools including provision of access for disabled students. Enriched curriculum used in resource schools, with autonomy in adapting curriculum.	Direct beneficiaries – 11,600 primary and secondary school students in the innovative schools. Indirect beneficiaries – 300,000 students in schools within the catchment area of the innovative schools. Indirect beneficiaries - 1.25 million students, with national resource school implementation in all primary and secondary school students ^b

LTMs = learning and teaching materials.

^a Government of the Kyrgyz Republic. *Education Sector Group's Appraisal Report: Education Development Strategy 2012–2020 Action Plan For Education Development 2012–2014*. Bishkek.

^b Kyrgyz administrative units include 2 shar (independent cities), 7 oblasts (provinces), 40 rayons (districts), and 722 ail okmotu (local units or townships) (<http://www.geopostcodes.com/Kyrgyzstan>). There are about 2,200 primary and secondary schools, or an average of 3 schools per ail okmotu. There is an average of about 18 ail okmotu and 54 schools in each rayon. One innovative school is assumed to serve an average catchment covering half of one rayon or about 27 schools. The average school size is about 580 students (1.284 million students / 2,200 schools).

Source: Asian Development Bank estimates.

13. **Project costs.** Project costs include those costs financed using grant funds as well as recurrent costs incurred by the government to sustain project investments and in certain cases to expand pilots nationally (Table 2). Costing assumptions are provided in the full economic analysis.

Table 2: Project Costs^a

Outputs	Costs – \$ million (Som million) ^b	
	ADB project grant, 2015–2021	Recurrent annual costs, 2015–2041 ^c
1. Quality of curriculum and LTMs improved	\$0.53 (Som25.92)	Average \$6.31 (Som315.30) per year (2015–2021), financed by the government, the textbook rental scheme revenues, or a combination. Assumed to grow in proportion to growing student population after 2021.
2. Quality of teachers and teacher training improved	\$0.46 (Som25.06)	\$1.40 (Som70.90) per year
3. Access to quality education through innovative schools improved	\$1.78 (Som95.50)	\$4.03 (Som201.70)

ADB = Asian Development Bank, LTMs = learning and teaching materials.

^a An exchange rate of Som to the US Dollar was Som51.95 to \$1.0 as of 14 August 2014.

^b All costs are at constant 2014 prices. ADB grant funding includes government counterpart funding of about 4.4%. Government funding is an estimated annual average amount.

^c Government cost includes (i) budget required to develop and print all textbooks for grades 1–11 less current budget of Som100 million; (ii) 75,500 teachers trained over 5 years at a course cost of Som9,091 (this is incremental to an estimated existing expenditure on training of Som70 million per year; and (iii) required investments of Som3,600 million for all schools based on needed funds for capital repairs, furniture, and equipment identified in Item 2.1.3 of the Action Plan 2012–2014 for the implementation of the Education Development Strategy of the Kyrgyz Republic, 2012–2020. The action plan spread these costs over 3 years, but in the current analysis they are phased in over 5 years then continue at Som360 million per year until the full amount is expended; after which, the annual level of expenditure to maintain facilities is assumed to be Som180 million, reflecting a 20-year lifespan. The amount shown is measured net of the current expenditure of Som30 million per year.

Source: Asian Development Bank estimates.

14. Overall costs for the primary and secondary school systems include the costs in Table 2 plus financing from the World Bank for a recently approved project that is a complement to the proposed program.⁷ The World Bank funding is \$15.08 million during 2014–2019.

15. **Economic returns on project investments.** The proposed project will improve the curriculum, increase the supply of textbooks, train teachers, and improve school learning environments. About three-quarters of the project grant is for curriculum and textbook investments. Research studies examining the determinants of education outcomes broadly agree that textbooks and learning materials have the biggest impact on improving primary school outcomes in many developing countries⁸. Estimates of impact from 2 developing country studies that expressed outcomes in terms of a change in the standard deviation of test scores range from 0.18 to .51 with a modal value of one third standard deviation⁹. These improvements

⁷ World Bank. 2013. *Project Appraisal Document on a Proposed Credit in the Amount of SDR 6.0 million (\$9.1 million equivalent)*. Washington, DC; and World Bank. 2013. *Proposed Grant in the Amount of SDR 4.9 million (\$ 7.4 million equivalent) to the Kyrgyz Republic for the Sector Support for Education Reform Project*. Washington, DC (Report No: 69576-KG).

⁸ M. Boissiere. 2004. *Determinants of Primary Education Outcomes in Developing Countries. Background paper for the Evaluation of the World Bank's Support to Primary Education*. Washington, DC: World Bank.

⁹ B. Fuller. 1987. *What School Factors Raise Achievement in the Third World?* Review of Educational Research Fall 1987, Vol. 57, No. 3. World Bank: Washington, DC. pp. 255–292; and S. Heyneman et al. 1984. *Textbooks in the Philippines: Evaluation of the Pedagogical Impact of a Nationwide Investment*. Educational Evaluation and Policy Analysis Summer, Vol. 6, No. 2, 1984. World Bank: Washington, DC. pp. 139–150.

are reflected in student scores on international tests of cognitive skills. The economic analysis adopts a Mincerian measure of the impact on income of additional education. It is assumed that program interventions increase the average rate of retention of students in the school system by one year and, based on recent studies in transitional economies¹⁰, that this in turn increases their average lifetime income by 7%.

16. The program's economic internal rate of return is estimated to be 23.8%. Sensitivity analysis indicates that the project economic performance is robust. Switching value analysis indicates that the assumed increase in personal income can be reduced from 7% to 2.08% while maintaining an economic internal rate of return of 12%.

17. The economic rate of return is likely to be slightly higher, reflecting positive externalities and longer-term intergenerational social benefits that come with increased levels of education, as mentioned in para 11 above.

18. **Distributional analysis.** Distributional analysis was completed to determine how project costs and benefits are distributed across income groups. The principle benefit to households is access to textbooks. Recurrent textbook costs will be recovered from taxes paid by households and businesses. The distributional analysis concerns the household burden of these new costs. Based on estimates of tax burdens by income group (Table 3), the poorest 15% of households will incur about 8% of these costs while receiving 20% of the benefits.¹¹

Table 3: Household Tax Burden by Income Group, 2011^c

Income Group	Household Income	Household Consumption Average Som per month	Income taxes	VAT	Household tax burden ^a	Income group tax share ^b
Lowest decile	3,918	3,707	211	171	9.7%	3.3%
2nd decile	5,456	5,091	364	319	12.5%	4.6%
2nd quintile	7,439	6,780	659	367	13.8%	12.1%
3rd quintile	10,075	9,152	923	621	15.3%	16.6%
4th quintile	13,566	12,294	1,272	578	13.6%	21.8%
9th decile	18,344	16,594	1,750	1,039	15.2%	15.0%
Highest decile	32,172	29,040	3,133	2,372	17.1%	26.6%

^a Average taxes paid / average household income.

^b Total taxes paid by income group / total taxes paid by all households.

^c Sources: Asian Development Bank; World Bank; T. Brück, et al. 2012. *Household Survey Data for Research on Well-Being and Behavior in Central Asia*. IZA DP No. 7055. Bonn: Institute for the Study of Labor; and United Nations World Food Programme. 2012. *Follow-up Emergency Food Security Assessment Kyrgyz Republic*. Rome.

19. If a textbook rental scheme is implemented, the cost share borne by poor households will be considerably lower since textbooks would likely be provided free to poor households, large households, and households receiving various social security payments.

¹⁰ L. Flabbi, S. Paternostro, and E. R. Tiongson. May 2007. *Returns to Education in the Economic Transition: A Systematic Assessment Using Comparable Data*. World Bank Policy Research Working Paper 4225. World Bank: Washington, DC.

¹¹ Assumes that all income groups have the same household size. Data on household size by income group was not available at the time of this analysis.