World Bank / Development Research Group

Public Services Research

Delivering Education in Zambia:
A Guide to Expenditure and Service Delivery Surveys
Jishnu Das
August 2002

Summary

Public expenditure tracking surveys (PETS) tool and quantitative service delivery surveys (QSDS) have added significantly to our understanding of the important issues that arise in the delivery of public services to the recipient population. This project integrates the PETS/QSDS approaches into an Expenditure and Service Delivery Survey (ESDS). The ESDS survey was fielded in Zambia in May/June 2002. The larger study, which includes the survey work, has three linked parts.

Part 1. Service delivery to schools

This part studies the movement of public expenditure through the delivery system, from the Ministry of Education to the schools. In doing so, the ESDS provides valuable insights into areas that can be further strengthened, especially with regard to capacity building at lower levels of the educational system. The school survey of 187 schools throughout the country focuses on the delivery of goods and services to the schools; it also links the performance of children tested during the NAS 2001 to teacher and school inputs. Appendix 1 maps inputs to education and their potential affect on outcomes.

Part 2. Funding and cash transfers

This part examines how funding that reaches the school—either as cash transfers or the delivery of educational materials—impacts pupils' test scores. The education sector in Zambia offers a unique opportunity to implement this strategy, by building on the excellent work carried out by the Examination Council of Zambia through the 2001 National Assessment Survey (NAS). The ESDS will be used to retest the children in the 187 schools tested under the 2001 NAS with the same test to arrive at the change in test scores over time (a method of analysis using "value-added" measures of learning). The need for retesting arises from the contamination of outcome measures such as test scores due to selection issues arising from the correlation of public expenditure with unobserved school and pupil attributes. Appendix 2 shows the complex flow of funds and resources in decentralized and presently centralized provinces in Zambia.

Part 3. School and household characteristics

This part will ascertain the impact of educational funding on enrollment, an issue that was recently identified as critical to the educational sector by the Permanent Secretary. The household survey will especially stress the link between health shocks (in the extreme case as the loss of a family member) and enrollment to disaggregate the effect of household level versus school-level attributes in determining the enrollment status of children. The household survey covers a catchment area of 36 isolated schools. Appendix 3 provides a map of catchment areas.

Issues

Meetings with various representatives of the government led to the identification of three key issues. The first was the flow of funds from the Ministry of Education to the schools, and the problems that may arise in the transformation of funding at the central level to improved educational inputs at the level of the school. The second was the enrollment rate in Zambia, which has historically been very high (compared to other similar countries), but has stagnated since the early 1990s. The third was poor achievement levels, as revealed through the National Assessment Survey (2000), a test administered to 5th graders in 400 randomly selected schools throughout the country. To determine potential government interventions in the education sector, it was thus critical that the ESDS focus on multiple outcome measures including enrollment and test scores. As the schematic representation above shows, the outcomes that we

examine in this study—enrollment, attendance and test scores—can be thought of as arising from a number of varied inputs with complex interlinkages. The critical challenge therefore was to design a study that can provide us with an understanding of these links and thus inform policy in this sector.

Strategy

Flow of funds and information

Although the Ministry of Education has been extremely active in the recent past in seeking to improve the flow of funds and information between different levels of the educational provision system—most notably through the decentralization of control and finances to district boards—there has been no systematic evaluation of the impact of these measures on the flow of funds and the ability of the decentralized bodies to respond to the needs of schools in their districts. The following instruments are used to assess the issue of funding:

- Provincial Education Office Questionnaire (Part II)
- District Education Office Questionnaire (Part II)
- General School Questionnaire.

Taken together, these three instruments study the movement of public expenditure through the delivery system, from the Ministry of Education to the schools. In doing so, the study will provide valuable insights into strengthening capacity building at lower levels of the educational system.

Test scores and school inputs

The second part of the study then examines how the inputs into educational delivery, which would be either funding inputs (such as cash transfers or the delivery of educational materials) or "human capital" inputs (such as teacher and head-teacher characteristics) impact the test scores of pupils. One way to do this is to use the existing 2001 National Assessment Survey scores in combination with data on school-level stocks and teacher quality. While this strategy describes the environment it *does not allow* us to establish *causal links* between school inputs and test scores, due to the drawback discussed next.

Attempts to identify the effects of educational inputs on outcome measures such as test scores are typically contaminated by selection issues arising from the correlation of such expenditure with unobserved school and pupil attributes. For example, consider a situation where there are two types of schools with different head-teacher qualities. Pupils in schools with high-quality head-teachers score higher, everything else being equal, compared to pupils in schools with low-quality head-teachers. In addition, high-quality head-teachers maintain the school property better than their low-quality counterparts. If the government follows a rule of providing more public funds to schools with poor infrastructure/educational materials, in this simple example, more funds will flow to the school with low-quality head-teachers compared to those with high-quality head-teachers. *Even if* public spending has a positive effect on test scores, this positive effect may be outweighed by the impact of the low-quality head-teacher

and it would (wrongly) appear as if schools with more public funding perform worse than schools with less public funding.

One way to deal with this problem is through randomized evaluations, where schools are randomly chosen to receive educational inputs and pupils are then tested at a later stage. An alternative way to identify the impact of public spending would be to examine *changes* in test scores over time in the same school rather then test scores at one given time in different schools. In the example above, if the school with high-quality head-teachers receives no public funding, there will be a small change in test-scores compared to low-quality head-teacher schools that receive more funding over the course of the year. Thus, even if the *absolute* scores in the low-quality head teacher schools are lower than their high-quality counterparts, the magnitude of the *change* will allow us to accurately assess the impact of educational materials and public spending on educational outcomes, a method known as the "value-added" approach to measuring learning outcomes.

The education sector in Zambia offered a unique opportunity to implement this strategy, by building on the excellent work carried out by the Examination Council of Zambia through the 2001 National Assessment Survey (NAS). The ESDS thus *retests* the children tested under the 2001 NAS with the *same test* to arrive at the change in test scores over time The relationship between these changes and the flow of funds and educational materials to the school in the preceding year will then be analyzed in some detail (Box 1).

Box 1. The Matching Exercise

Clearly, the usefulness of our entire retesting exercise depends on our ability to match pupils with teachers, and to carefully identify the changes that could have potentially affected the pupil during the last year. This turned out to be the most difficult part of our exercise, and was done through three related instruments:

- Head-Teacher Matching Roster
- Pupil Matching Roster
- NAS Pupil Questionnaire *(not available electronically).*

Initially, it was our belief (verified during the pilot) that we could capture most of the teachers who had taught the pupils in our testing sample by interviewing teachers currently teaching grades V and grades VI. During the main survey however, we quickly discovered that this strategy was not working well for the big Lusaka schools, where teachers were constantly moving across grades.

To deal with this problem, we changed our strategy by first going to the head-teacher and asking him/her if we could talk to teachers *currently teaching Grade VI* and teachers *who taught Grade V* the previous year. We then went through the pupil-roster asking for each pupil the name of the teacher who taught the pupil the previous year, and the name of the teacher who is currently teaching the pupil. This exercise was implemented through the **Head-Teacher Matching Roster**. For each teacher who was then followed up (which would happen if the teacher had taught the pupil either the year before or is teaching the pupil this year) we implemented the **Pupil Matching Roster**—which then ask the teacher in detail about each of the sampled pupils.

Finally, this strategy yielded valuable information about changes in school inputs during the interim period between the two tests, but no information on changes in household inputs during this period. The changes in household inputs are measured instead through a repeat administration of the **NAS Pupil Questionnaire** (available soon!), which we will then analyze for transitions such as potential changes in the wealth of the household.

Since the pupils who were tested in the previous year are now (except for those repeating a grade) in Grade VI, the instruments for the study focus on the measurement of inputs flowing into Grade V during 2001 and Grade VI during the first term of 2002. In addition, special focus is given to the attention that each child who was tested receives from the teacher and the head-teacher, which may be important inputs into a child's performance. The instruments used to measure these inputs:

- The Teacher Questionnaire combined with The Annual School Census Return (GRZ) (*census information not available electronically*)
- The Teacher and Pupil Questionnaires of the NAS (*not available electronically*)
- The General School Questionnaire
- The Head-Teacher Questionnaire

Survey Descriptions

Measurement of school inputs

The Teacher Questionnaire is designed to examine two sorts of inputs that may impact on the performance of a teacher: first are the teacher-inputs such as demographic and educational characteristics and second are institutional inputs (primarily teacher salaries). The teacher questionnaire thus focuses on obtaining a basic demographic and educational profile of the teacher, and then moves on to asking about salary and allowances, as well as delays in the receipt of payments.

The Head-Teacher Questionnaire starts with the same sections as the teacher questionnaire. Several additional sections then probe the characteristics of teachers, pupils, parents (through the PTA section) and the administrative structure (through the Relationship with DEO/PEO sections). Finally the head-teacher questionnaire also contains a section on decisions and shortages, where we try to understand the nature of the financial constraints that schools are operating under.

The General School Questionnaire has a three-fold purpose. First, we believe that school infrastructure and location themselves may be important for learning achievement; the first few sections of this questionnaire thus systematically ask about the availability and condition of infrastructure in the school. Second, the questionnaire examines the characteristics of the pupil population in the school such as the overall profile of attendance and grade-repetition. Finally, the questionnaire links to the DEO/PEO questionnaire to complete the Public Expenditure Tracking exercise. To enable us to track the flow of resources, the questionnaire then asks about the receipt of resources from other levels of the administration such as the DEO and the PEO's offices.

The District Educational Office and Provincial Education Office Questionnaires like the General School and the Head-Teacher Questionnaires, are designed to address two different components of the survey. Part II is concerned with the tracking of public expenditure—how much do the DEO and PEO offices receive? What are the primary expenses in these offices? Part I is similar in form to the head-teacher questionnaire, and asks about the

demographic and educational characteristics of the DEO/PEO, before moving on to examine the views of the DEO on their relationship with schools (through visits and inspections) and the overall educational administration.

Measurement of enrollment and school inputs

While the impact of educational inputs on test scores applies to children already enrolled in school, it omits the relationship between public funding and the choice to attend school in the first place. The third and final focus of the ESDS relates school and household characteristics to ascertain the impact of educational funding on enrollment, an issue that was recently identified as critical to the educational sector by the Permanent Secretary.

One of the problems with using enrollment as an outcome measure is that schools do not collect any information on non-enrollment among villages in their catchment area. While the **General School Questionnaire** includes a section on non-enrollment, but it became clear during the pilot that this information is sparse and unreliable. Further, even if this information were available, it would be important to relate such non-enrollment to household characteristics, such as wealth, education and health status. The ESDS examines enrollment and its relationship to school attributes through a limited household survey in a select sample of schools.

The **Household Survey Instrument**[1] stresses the link between health shocks (in the extreme case as the loss of a family member) and enrollment to try and disaggregate the effect of household-level versus school-level attributes in determining the enrollment status of children. A careful disaggregation has important policy implications. For instance, if it is the case that health or income shocks (household attributes) rather than the number of textbooks or teachers (school-level attributes) are the predominant reason for low enrollment, policy aimed at improving school characteristics may be less beneficial than those aimed directly at improving household living conditions. Similarly, bursaries to children may have a much greater impact on enrollment than textbooks to schools.

During the pilot we noticed a number of complex arrangements regarding the funding of school inputs in families, and often, it is the case (particularly in the case of children who may have lost one or more parents) that school funding for a child is provided by members of the extended family who may be living in other households, and in some cases other villages. This aspect of schooling in Zambia is addressed throughout the questionnaire (and in more detail in Sections IV and IX).

Sampling Notes

Since our study is linked to the National Assessment Survey in the previous year, the choice of schools in our sample was restricted by the sampling methodology of the NAS. The NAS sampling was based on a probability-proportional to size methodology, and from the

---

[1] Also see *Community Information* and *Community Roster* questionnaires, which provide information on the community and on the list frame of households that was used to sample from within villages.

NAS sampling, we chose to undertake the ESDS in half the schools covered in the previous assessment. The choice of these schools is described in detail in the sampling notes on schools.

For households, since we were primarily interested in examining issues concerning enrollment and attendance (and **not** school choice), we tried to make sure that the villages in which households were surveyed only had **one school** that they could potentially attend. To implement this strategy we used data collected on the location of these villages by the Ministry of Education, GRZ. Based on this data, the catchment area of each school was mapped using Thiessen polygons (Appendix 3), where each edge of the polygon was defined as the midpoint between the school in question and the closest alternative school. Based on this exercise 38 schools were located for which the *closest edge* of the polygon was at least 3 kilometers away from the school. Out of these 38 schools, 36 villages in the catchments of these schools were surveyed: our initial results suggest that this methodology has worked extremely well, with less than 5 percent of children enrolled in schools other than the one surveyed. this strategy is summarized in the accompanying note on the household sampling.

Contributors

The complexity of this project has required inputs from a large number of individuals and institutions. A brief list of the individuals working on this project and their areas of contribution and expertise follows.

Stefan Dercon (Oxford University): Overall strategy, sampling, design of instruments, training of household survey team and implementation of household survey, data analysis.

James Habyarimana (Harvard University): Household sampling, design of instruments, implementation and training during the pilot survey, implementation and training during final survey, management of final survey, database creation and management, data analysis.

Pramila Krishnan (Cambridge University): Overall strategy, sampling, design of instruments, implementation of household survey, data analysis.

Paul Machona, T.S. Sakala, Joe Kanyika, and Ms. Teza (Examination Council of Zambia): Co-ordination and implementation of retest and codification of data, analysis of learning achievement.
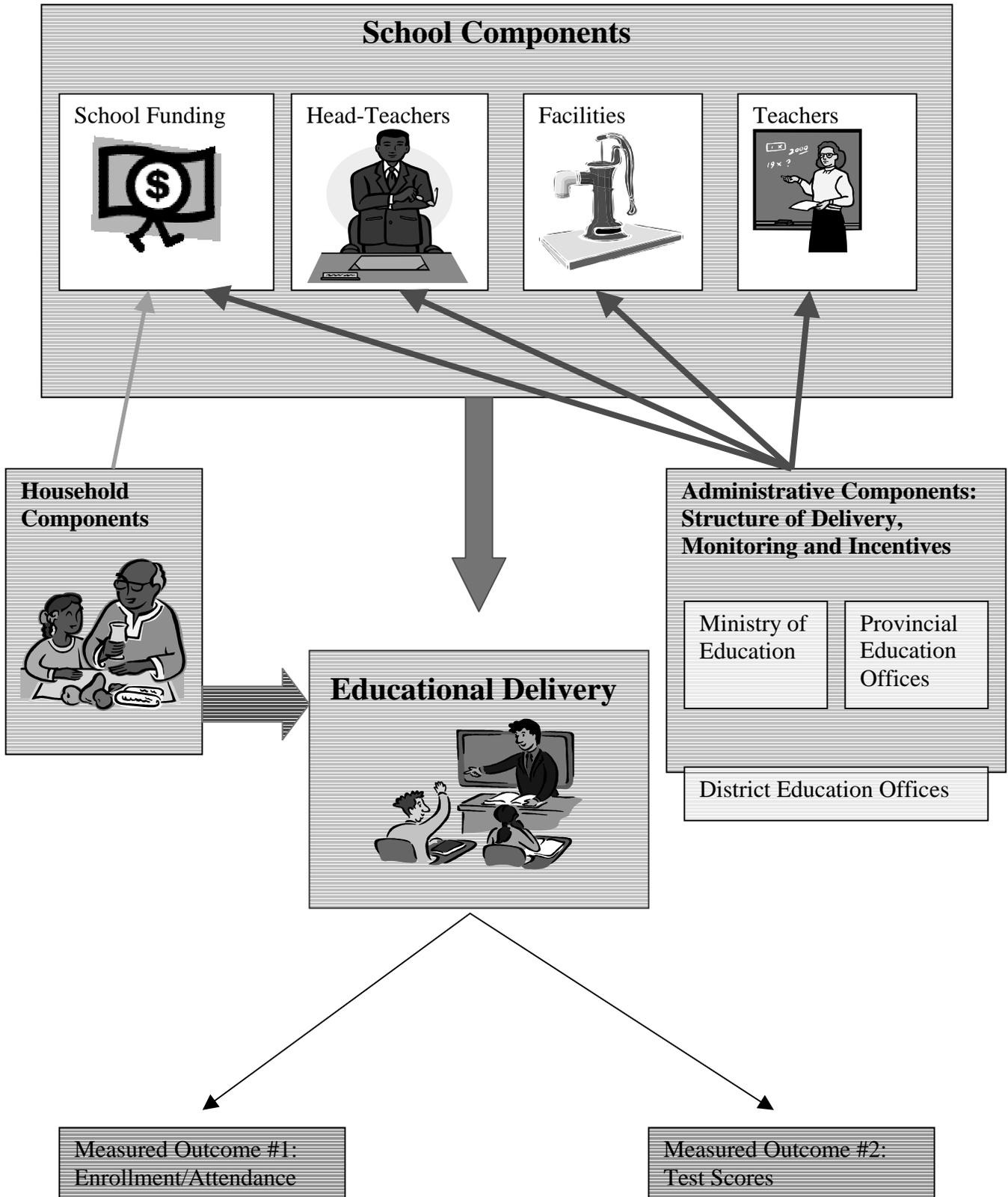
Dennis Chiwele (Rural Net): Administrative and logistic support for school survey, provision of surveyors.

Inyambo Mwanawina (University of Zambia): Supervision, administration and logistic support for household survey along with provision of surveyors, assistance in design of instruments and household survey training.
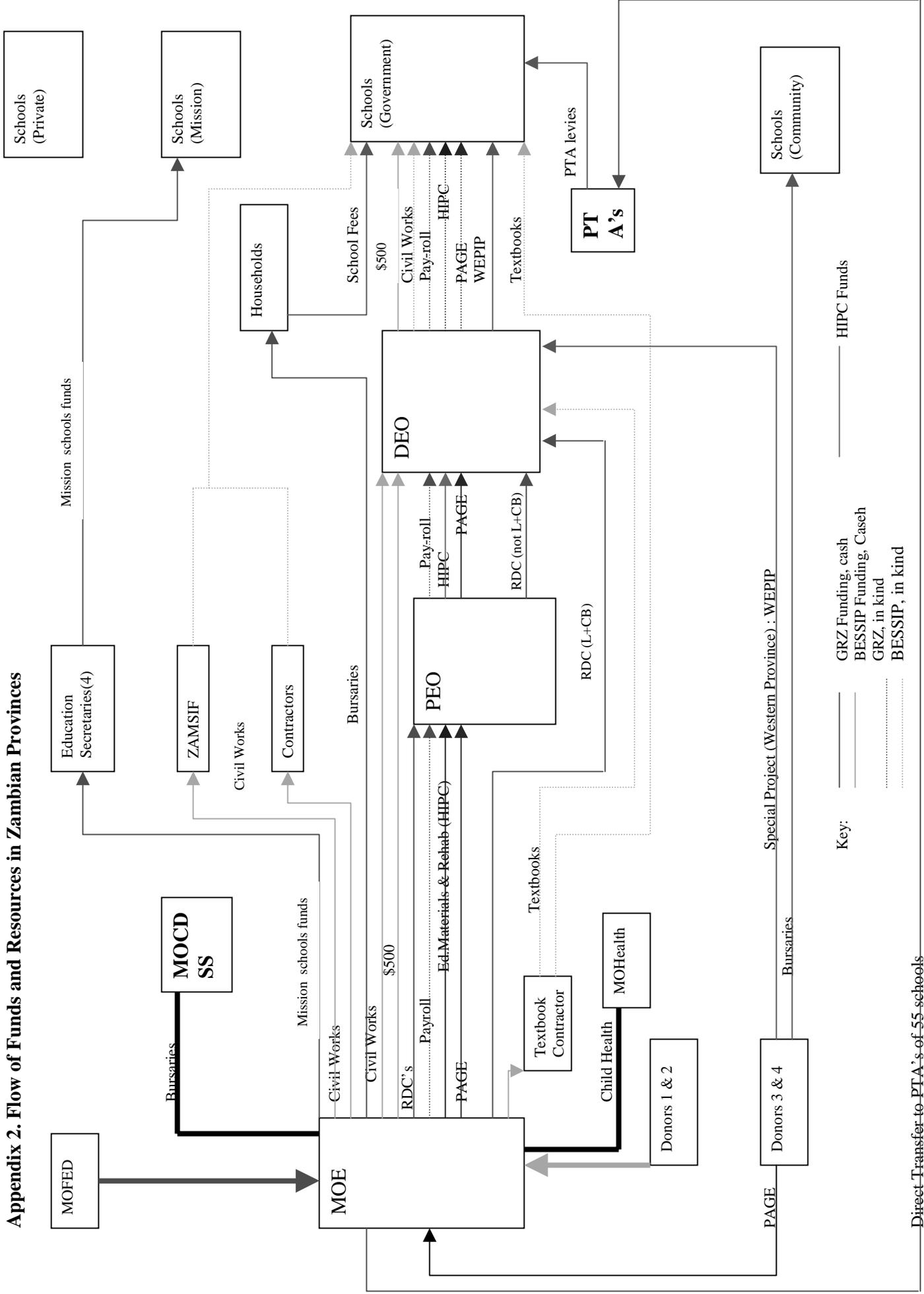
Steering Committee, Republic of Zambia: Coordination among GRZ counterparts and design of instruments.

Tristan Zajonc (Pomona College): Preliminary analysis and data integrity, checking algorithms.
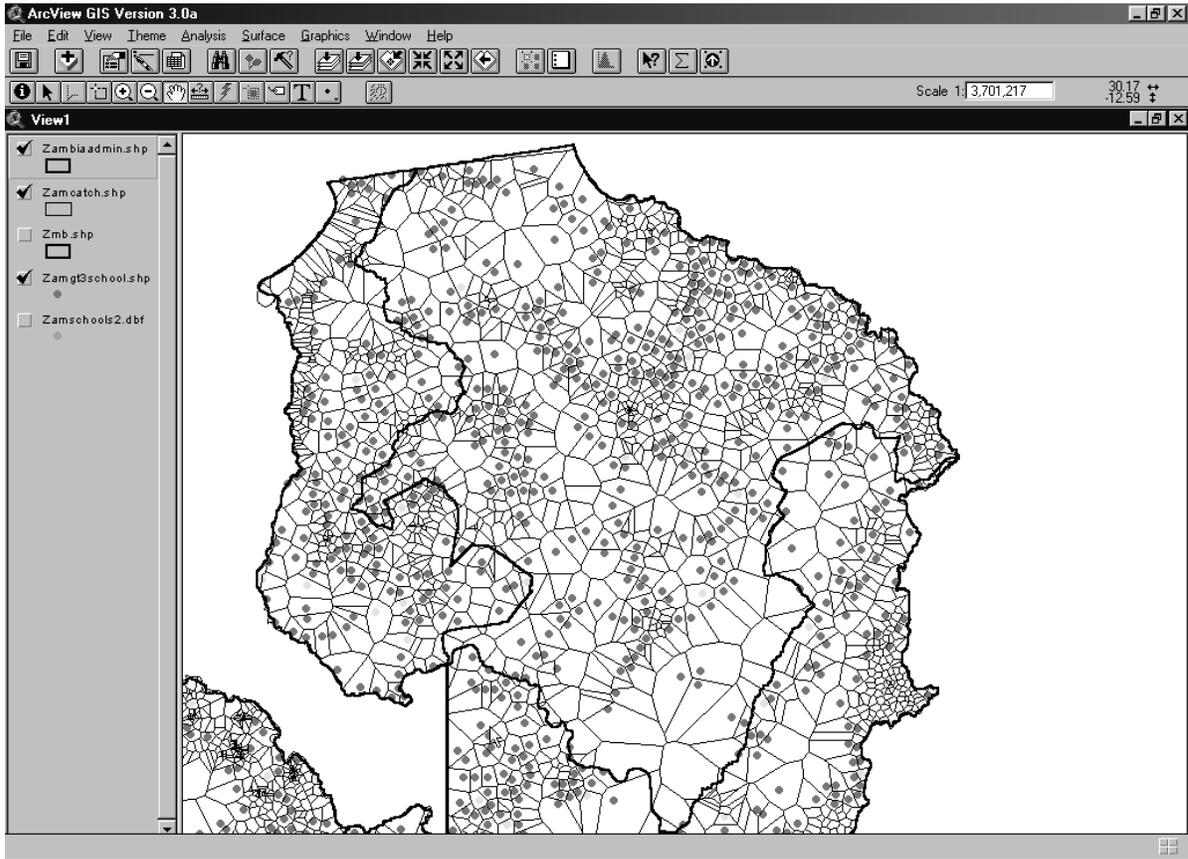
Appendix 1. Education System Inputs

School Components

School Funding	Head-Teachers	Facilities	Teachers

Household Components

Educational Delivery

Administrative Components: Structure of Delivery, Monitoring and Incentives

Ministry of Education	Provincial Education Offices

District Education Offices

Measured Outcome #1: Enrollment/Attendance

Measured Outcome #2: Test Scores

Appendix 2. Flow of Funds and Resources in Zambian Provinces

Key:

GRZ Funding, cash	
BESSIP Funding, Caseh	
GRZ, in kind	
BESSIP, in kind	

Appendix 3. Catchment Area

Note: Each dot is a school, and the lines define the Thiessen polygon around the school.

M:\PS Document Library\PSwebsite\Zambia\Zambia.guidetosurveys.das.aug22.2002.doc
August 23, 2002 11:27 AM