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EDUCATIONAL POLICY AND
PLANNING PROJECT

A GOVERNMENT OF INDONESIA - USAID PROJECT

Education Indicators for
Policy Purposes in
Indonesia

June 1990



Pusat Informatika
Balitbang Dikbud

Center for Informatics
Office of Educational and Cultural Research and Development

DEPARTEMEN PENDIDIKAN
DAN KEBUDAYAAN

MINISTRY OF EDUCATION
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James Cobbe
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INTRODUCTION

This paper addresses indicators as such. It deals separately with primary education, secondary education (both Junior and Senior combined), and higher education. Each section is divided into three parts. The first suggests indicators that could be derived from currently available data, but which do not yet appear to be routinely calculated and widely disseminated. The second suggests further indicators that could be derived from information that probably could be obtained relatively easily from revision of the annual education statistics questionnaires. The third suggests other possible indicators that would be desirable to obtain, but which do not appear easy to get in the short run from the existing data system.

Indicators are defined as quantitative characteristics of the education system. Indicators are required in Balitbang Dikbud for general policy purposes, and, potentially, for purposes of resource allocation within the educational system.

We need to distinguish between raw data, conventional statistical data, and indicators. Raw data are the numbers on statistical returns such as the annual educational questionnaires; in themselves, they are essentially useless for policy purposes. Conventional statistical data are the totals, averages, and ratios presented in, for example, the Statistik Persekolahan SD 1986/1987. Indicators, however, are derived statistics that are likely to be immediately, or nearly immediately, meaningful or informative for policy purposes.

Indicators, therefore, should permit immediate (or nearly immediate) inferences about the performance of the system from the point of view of objectives of the system. These objectives may be *efficiency* ones (getting the most from the system given resources used), either *internal* (achievement of educational objectives) or *external* (from a broader social perspective, getting the most from the system, e.g. the highest economic return on the resources used in education after graduates enter the labor force); *quality* ones (improving the educational value added by the education system, i.e., gains in achievement as a result of the educational process); or *equity* ones (measures of the fairness of the distribution of educational resources, opportunities, and/or outcomes across relevant categories such as province or region or district, income class, urban/rural, ethnic group, etc.).

Indicators may speak to such objectives directly, or indirectly in terms of the inputs to the educational process, the process itself, its outputs (either as conventionally defined or, less probably because they are much more difficult to measure, as conceptually defined), or the eventual societal outcomes of the process (such as changes in economic activity and earnings gains attributable to educational achievement).

The development of an indicator system has to interact with the data collection and management information systems. Modification to these systems should only be made relatively infrequently and after careful consideration, because in a very large system such as the education system in Indonesia, change is slow, costly, and can be disruptive. However, potentially one of the greatest benefits of developing an indicator system is that it can act as a corrective to the dynamics of the data collection system. Indicators do not exist, and are not developed, just for the sake of producing numbers. The whole idea behind indicators is that these numbers are wanted for a specific, policy-relevant purpose. Thus, in working from desired indicators to necessary data, and back from available data to possible indicators, the analyst is continuously encouraged to ask the questions:

What policy purpose can this indicator serve?

Why do we collect these data? What policy purpose can they be manipulated to serve?

How can these data that exist be transformed and presented in a way that makes them relevant as an indicator to a policy issue?

What quantitative data, either already available or feasible to obtain, can be transformed and presented in a way that would throw light on this policy issue?

What indicator would throw light on this policy issue? Can it be derived from existing data? From data that could feasibly be collected?

If data are needed that do not exist, is it feasible to collect them? At what cost? How soon could they be available? How accurate do they need to be? Is a census (annual questionnaire to all schools) the best way to collect them, or, considering cost, speed of availability, and accuracy, would a sample survey be better?

By continually asking such questions, and having them the subject of dialogue between those responsible for policy analysis and those respon-

sible for data collection, the information system can be gradually made more useful for policy purposes, and data collection that has outlived its usefulness (if it ever had one) can be eliminated.

As a caveat, it should be noted that the first draft of this paper was begun when I had been in Indonesia for only a short time. The suggestions made are tentative, and errors and lacunae may follow from my ignorance of the Indonesian context. In particular, many of the indicators I suggest in the first part of each section are probably being calculated already somewhere within the Ministry; I feel very conscious of the fact that the majority of the suggestions made are extremely obvious and are likely to suggest things that are already being done.

1. PRIMARY EDUCATION

1. A. Indicators Derivable from Extant Data

The current *Statistik Persekolahan SD* contains a wealth of data on primary education. The bulk of these data are presented as raw total numbers by Province, generally divided also by Public/Private, and often in addition by status of Public (Inpres or regular). Given the means by which these data are generated (a questionnaire to each school, summarized at Kecamatan, Kabupaten, and Kanwil levels), most of the indicators that will be suggested here could also be calculated by Kanwils for the Kabupaten subunits within them. Thus the indicators appropriate at national level (showing information about distribution across Provinces, and thus permitting inferences about quality, equity, and efficiency at that level) can also be used at the Province level to permit inferences about quality, equity, and efficiency across Kabupaten within each Province, and even in principle for Kecamatan within Kabupaten. However, for the statistical procedures to permit the full benefit to be derived from the data collected on questionnaires to primary schools as that data flows up the system, it may be necessary to make some modifications to the current procedures of reporting the data.

Basically, these involve summarization at each administrative level, with only appropriate totals being reported on up the administrative chain. This greatly speeds processing, and reduces the need for transmission of massive quantities of detailed data to the center and their processing there. However, it also of course suppresses information about the dispersion and distribution of the underlying data within the subunits from the point of view of units more than one step removed from the subunit level in question. Thus the center knows nothing about distribution within prov-

inces, provinces know nothing of distribution within Kabupaten, and Kabupaten know nothing about distribution within Kecamatan. This implies, for example, that it is only possible to make the most crude inferences about rural/urban differentials.

Two possible modifications of current procedures to overcome these problems are as follows. First, Kabupaten could be classified, nationwide, as either predominantly urban or predominantly rural, the lists provided to Kanwils, and Kanwils instructed to report totals by urban/rural Kabupaten as well as the grand total. Second, some crude indications of distribution might be sent on up the system in addition to the summary totals. A simple indication that could fairly easily be transmitted using manual collation techniques would be extreme values, so that at each level the range at each unit in the preceding level was available. A more informative indication that it might become feasible to have transmitted later would be the percentage (or total number) of units at each level that lay outside some preset range, e.g., the national 10th and 90th percentiles from the previous year (as inferred from the range data, so long as it had gone all the way up for all levels).

Obviously there are other possibilities as well; the important point is that for the center to be able to make useful equity inferences beyond the rather crude provincial level ones, more data on distribution within provinces is needed at the center. However, it is crucial that whatever techniques to obtain this distribution-within-provinces information are adopted, they not greatly slow the processing and transmission of the data, and they not be open to misinterpretation, miscalculation, or confusion at the subordinate levels of the hierarchy, and therefore should be simple and feasible at low costs given current procedures at those levels.

Some ratios are calculated in the current *Statistik Persekolahan SD*. These include pupils/school, pupils/class, pupils/teacher, classes/school, classes/owned classrooms, classes/teacher, classes/civil-servant-teacher, teachers/school, administrators/school, school guardians/school, and pupils/grade. However, apart from these ratios, the only derived statistics presented are on dropouts and progression tables reflecting current repetition and dropout rates and that follow cohorts through the system, on a national-average basis. An initial step to improve equity indicators, and efficiency information on a provincial basis, would be to also calculate the repetition and dropout rates on a provincial basis as well as the national one.

For policy purposes, raw numbers have limited use. It is generally the relationships between numbers, and the trends in them, that signal the need for more information or action. Of course, the raw numbers eventually must come back in to allow estimation of the magnitudes of implementation problems for any policy decisions that may be considered, but initially the focus for policy indicators is typically derived statistics, not raw totals.

The most obvious next suggestion is that data from other sources need to be combined with MOEC data for some indicators. Walter McMahon has already suggested routinizing data acquisition on employment and earnings by education level, and this should obviously be pursued. Also needed, however, are demographic data. Consultation with staff and consultants of KLH (Ministry of Environment and Population) suggests that estimates are obtainable, by province, of population by single-year age and sex. These estimates will, of course, not be precise, but their error level is unlikely to be wildly different from that in the primary school data on pupils by age; and routine liaison between the education statisticians and the demographic statisticians in KLH to resolve apparent inconsistencies may well assist improvement to the quality of both types of data.

Population by age and sex data by province should be obtained and used to estimate age-specific enrollment ratios by sex and province, i.e., it is entirely possible to have estimates of the percentage of, say, six-year-old boys in each province, or of ten-year-old girls in each province, who are in school. These indicators are urgently needed because population growth rates and, therefore, age structures of the school age population, differ substantially by province and thus crude enrollment data and growth rates of enrollment give no reliable indication of the degree to which movement toward universal primary education is being achieved by province. The underlying point here is very simple. In a given year, the majority of those who die are old, whereas most of those who join the population in a given province are age zero, newborn (not all because there is some migration). The faster the natural rate of increase in a province, the larger the excess of this year's births over last year's -- because that is how the growth occurs, through more births than deaths.

In an age pyramid of the population (age on the y-axis, numbers of males each age on x-axis to the left, females on x-axis to the right), the population with the faster growth rate will have a broader base (number age zero) and will taper more rapidly as age increases. Thus the ratio of, say six-year-olds to say twelve-year-olds will be larger in a province with

a more rapid population growth rate than in one with a slower population growth rate. One might think these differences would tend to be small, but they are of course cumulative over time, and my very limited knowledge of Indonesian demography suggests that the degree of interprovincial variation in rate of natural increase is sufficient to imply that the age structures of the different provinces vary enough to make age-specific enrollment ratios by province essential to any meaningful comparison of the degree of provincial variation in progress toward universal primary education. The ratios of new entrants to population age seven (or six), and graduates to population age twelve (or eleven), would be particularly useful to have and to watch for trends over time. Given the relatively high national-average dropout and repetition rates currently. Those for 1985/86 to 1986/87 imply that, at unchanged rates, of 1000 pupils entering Tingkat I, only 417 would graduate six years later (more would graduate later after repeating grades), there is likely to be substantial inter-provincial variation in graduates to population-age-twelve ratios.

The existing data on progression through the system, and of repeaters (from which estimates of numbers of dropouts are derived), would permit the construction of several useful indicators. By province, for public and private schools separately, it would be possible to calculate the number of pupil-years of attendance required to produce one graduate at current progression, repetition, and drop-out rates, and to break this down into pupil-years (fractionally greater than one) in each of the six grades (the basic methodology is illustrated at the national average level on pages 2-183 to 2-195 of the IEES April 1986 Sector Review, Volume 1). This could then be combined with the data on average class size by grade and province to imply, by province, an index of how many graduates are produced for each staffed-class-year of input. This, and the pupil-years of attendance per graduate, would be more useful summary indicators of internal efficiency than any currently published. With current data, this could not be broken down by sex; but if the primary school questionnaire is revised, as it should be, to report repeaters by sex in addition to grade, then it could be. It might also be worthwhile to calculate a variant of this indicator, taking actual ratios of regular classroom teachers (*guru umum*) to classes by province, and calculating the implied number of graduates per *guru umum* by province. It is likely that these three indicators would indicate considerable variation in internal efficiency across provinces.

One other very simple ratio that might usefully be calculated from extant data would be the ratio of enrollment in grade 6 to enrollment in

grade 1 by province and public/private. Provincial variation would not be very revealing in itself, because much of the variation will be caused by demographic differences between provinces, but differences, if any, between public and private would indicate something about the comparative internal efficiency of public and private schools by province. Of course, the three measures of internal efficiency suggested above could also be calculated separately for public and private schools, but the one that is perhaps of most policy significance in Indonesian conditions, graduates per classroom teacher, will not be very meaningful until the questionnaire is revised to permit inferences about full-time-equivalent teachers, because of the reported proclivity of private schools to employ part-time teachers. However, for the vast majority of provinces, private schools are almost insignificant at primary level. The exceptions are a few provinces with relatively large Christian populations, and possibly attention to private/public differences can be confined to them.

At this time, there are no other complex derived indicators to suggest. However, much of the data in the current *Statistik Persekolahan SD* that is presented as raw numbers would, if presented instead as percentages, or even more, as cross-tabulations in percentages, serve as useful indicators. In some cases, for policy purposes, the data would probably also need to be rearranged in different groupings initially for indicator purposes. For example, currently the age of new entrants is reported as raw data by province for 6 years and under, 7 (the modal age in each province), 8, 9, and 10 years. For policy purposes, a more useful presentation would be the percentage distribution of ages of new entrants for each province, with the category "8 years or more" perhaps initially replacing the current final three categories. Other data for which percentage distributions and/or cross-tabulations would be far more revealing than raw totals, include the percentage of each category of teacher who are not civil servants, by public/private and province; the qualifications of teachers (usefully two percentage breakdowns: % with some teacher-training in each province, and then separately % SD only; % JSS; % SSS; % more; and cross-tabulated), again public/private and for each province. Similarly, most other tables; percentage presentations would be more meaningful for initial policy purposes than raw numbers (e.g., conditions of classrooms, classrooms owned; and also percentage breakdowns between public and private for schools, teachers, pupils, classes, new entrants, and graduates; possibly arrayed close to percentage distribution by religion of pupils for each province to flag instances where the

explanation of the variation is not connected to religion; and percentages of school in each province, public and private, operating double-sessions).

A further category of indicators that could, and should, be generated by marrying the education statistics with other available information is macro-based expenditure ratios. Available fiscal data on expenditures by the MOEC, Home Affairs, APBD I & II, SBPP and Inpres SD, should be organized by province for primary level education, and from them should be derived various expenditure ratios (expenditure per pupil, per class, per graduate, per teacher, etc.) Note these will be public expenditure ratios only, not unit costs (because data on private expenditures are not readily available as yet); if suggested changes in the primary questionnaire are made, by province estimates of unit and cycle costs might be possible as annual indicators.

1. B. Indicators Obtainable by Revision of Questionnaire

We will begin this part by a quick review of the primary school questionnaire. One very simple revision that would be very valuable has already been suggested, namely the identification of repeaters by sex as well as grade. This requires merely dividing the response boxes in section 2.f. of the questionnaire into "L" and "P" boxes with dotted lines as in section 2.d., and would not add to the length of the form. Currently schools provide their data on "Format: T", which is a single sheet of A4 paper printed on both sides. It is clearly desirable to keep the questionnaire on the single sheet of paper, and it would probably be undesirable to use a larger sheet than A4. Accordingly, in revising the format attention needs to be paid to effects on space required.

However, some information requested is probably redundant, because it does not change from year to year, and schools are now identified by unique "Nomor Statistik Sekolah" codes. Hence 1.d., year of establishment, could be eliminated. Space in section 1. (on the school itself) could also be saved by rearrangement of response code identifications for c. and e. from vertical to horizontal.

Section 2. Pupils

2. a. Data requested on the EBTA exam appears minimal. If feasible, average grade scored by all candidates should be added.

2. b. is useful and should remain as is. A review of the exam and its scoring system might also suggest more detailed information on performance that might be worth requesting, if it reflected meaningful educational achievement.

2. c. At first sight, this (requesting the age distribution of new entrants to Tingkat I) appears redundant to the Tingkat I column of 2.d. (which requests age distribution data for all pupils by Tingkat), but of course is not because typically Tingkat I will contain unusually large numbers of repeaters (16.7% on average, nationally, in 1986/87). However, wording of the question can perhaps be improved; on the example I am working from, the question has been totally misinterpreted, the headmaster in question responding with the age distribution of all pupils in the school.

2.d. is useful and should remain as is. Below 2.d., possibly using the same columns for Tingkat by sex, it would be desirable to get some information on actual attendance and facilities by pupil. Currently, the information requested is "as of 31 August;" the school year normally begins in July. Presumably, most headmasters are responding with the numbers of pupils registered as of 31 August. It is worth considering adding a line requesting actual average daily attendance, by sex and Tingkat, for some specified week toward the end of August. It would be even better if actual attendance data could also be obtained for another week close to the end of the school year, but that information could not feasibly be obtained through the annual questionnaire. If the indicator project proves useful, it might be worth considering small sample surveys of schools at one or two other times during the school year (or perhaps even quarterly) to get information on attendance rates because they are liable to change within the school year, and probably not in a uniform fashion in all provinces. I am told that all schools are required to keep attendance registers so that calculation of average attendance for a specified week should be feasible for all headmasters.

It may also be worth considering adding lines, again using the same columnar format as 2.d., requesting data on how many pupils have specified text books. Policy is that all should have, so possibly this is redundant, but if there is reason to believe this is not actually so (particularly in private and/or remote schools), a few lines devoted to this would be useful input data. Similarly, consideration might be given to a line requesting data on furniture available to pupils (e.g., by Tingkat, how many pupils sit at desks/on benches/on the floor); the appropriateness and usefulness of such a question must be judged by persons with more local knowledge than I have.

2.f. As noted above, divide repeaters by Tingkat into male and female.

Section 3. Personnel

Consideration should be given to eliminating 3.b. (sex of teachers), and splitting the response columns in 3.c. (detail on teachers by qualification) into male and female. In addition, it would be very desirable to add a section 3.d. requesting information on staff turnover, i.e. new hires and separations, since the previous reporting date (i.e., 31 August of prior year). The degree of detail requested should probably be decided by persons with more local knowledge than I, but I would suggest at a minimum information on qualifications of new hires (e.g., one horizontal line divided by qualification categories, or possibly two lines, one for male and the other for female), and on reason for leaving for separations (e.g., one or two horizontal lines with entry spaces for retired, better job elsewhere, family reasons, financial exigency on part of employer, entered further study, deceased or disabled, etc.). When information systems permit, the detail on teachers in post could be eliminated wholly and reliance could be placed on past data and the turnover information each year to update them. It might also be helpful to know (and would not take much space on the form to ask) whether new hires have previous teaching experience or not. It is also striking that at present the questionnaire only requests numbers of teachers, and implicitly assumes all are full time. Maybe this is institutionally accurate, but this seems unlikely for non-civil servant teachers. It could be addressed by a single question asking how many of the teachers identified above are part-timers, and how many hours/week on average these part-timers teach.

Section 4. Buildings

This question is probably useful and should be retained. Consideration might be given to asking questions about teaching aids if local knowledge suggests this is relevant and varies, e.g., how many class rooms have blackboards?

Additional possible questions:

Consideration should be given to making inquiries about fees paid by pupils. The exact format and wording of the questions will require care, but presumably headmasters know what pupils have to pay to attend their schools, and can specify these amounts according to BP3, private school tuition, one-time development contributions, and other. There is no obvious reason why a question of this type on the primary school questionnaire would produce less good data than the other questions, and it should be included. As noted above, suitably combined with government

fiscal data, this might permit annual estimates of unit costs and cycle costs by province, as well as of "local effort" or family share (percent of total costs provided by families). These could be very useful indicators of relative efficiency across provinces, and especially its variation (which gives an indication of how much might be saved if lagging provinces could be pulled up to the level of efficiency of the leaders), and are essential inputs into the calculation of indicators of external efficiency for primary schools.

With respect to the actual revision of the questionnaire, if many of the suggestions made above are considered worthy of inclusion, it may be difficult to redesign the questionnaire to fit on one sheet of A4 paper. Two possible solutions if this is so are: (1) use a folded A3 sheet, giving a four-side A4 leaflet; (2) provide instructions and coding information on a separate sheet, permitting actual question formats to be reduced. Whichever, if some of the changes suggested above are adopted, great care should be given to the writing of instructions so that it is clear and unambiguous how questions should be answered (e.g. on average attendance). When the questionnaire is revised, rather obviously statisticians and format designers with appropriate experience should be closely involved to ensure that the revised questionnaire is appropriate both for completion by headmasters and compilation at Kecamatan level. Pilot testing at both the primary school level and Kecamatan level will also be necessary before a new questionnaire is put into general use. Particular attention should be paid to the procedures developed for summarization at Kecamatan level to ensure that correct data are transmitted up the hierarchy.

It seems almost superfluous to discuss the additional possible indicators that the additional data would permit, but in the interests of completeness I shall list some of them:

EBTA data	Achievement data (to extent exam is good) [output indicator]
Attendance	Attendance/registration ratios [input]
Texts	Texts/pupil by subject [input]
Furniture	Per pupil [input]
Repeaters by sex	discussed above, permits several important indicators of internal efficiency to be calculated separately for male and female.

Teacher turnover	Express as ratio to establishment; aspect of inputs, also valuable administrative/managerial indicator (high value indicates problem)
Part-time teachers	Allows more sophisticated input measure if permits conversion of teacher numbers into FTE (Full Time Equivalent) teacher numbers.
Teaching aids	Ratio per class or teacher [input, possibly also process]
Fees	Per pupil; permits calculation of annual per pupil direct costs (unit cost), cycle cost, family share of direct costs.

1.C. Other Possible Indicators

I am reluctant to suggest much in the way of additional effort to generate more indicators requiring new data collection efforts. My superficial impression is that there are already plenty of data, that it is presentation and use where the major problems lie, and that with some of the suggested revisions to the primary school questionnaire a more than adequate set of indicators for most policy purposes would be feasible to construct and disseminate. However, it is clear that the discussion above does concentrate heavily on, in the jargon, inputs and outputs, with some attention to costs, but with very little on either "process" or outcomes. With respect to process, this is somewhat inevitable because it is difficult and of dubious value to collect attempts at quantified indicators of the actual educational process on a large scale basis. If the users of data believe that indicators of process are needed and would justify the costs of collection, almost certainly the only approach to collection that is likely to be at all acceptable in terms of cost and accuracy combined would involve visits to small samples of schools to make direct observations, and to administration offices to sample records and interview personnel. Although such data may in the long run yield useful research results (although there is no guarantee of that), it is unlikely that any easily obtainable process data qualify for inclusion in a set of indicators for short to medium-term policy purposes.

With respect to outcomes, the situation is different, in that it is only by measuring outcomes that it is possible to judge how effectively education is serving the purposes for which society supports it. However, where the declared aim is that primary education should be universal, the nature of the outcome information that should be sought differs from that

appropriate to levels of education that are explicitly not intended to be universal. Bluntly, if we have already decided that, when resources allow, all persons in the relevant age group shall receive a full primary education, then economic measures of the rate of return to investment in primary education are, to a large extent, irrelevant, unless it is possible that the policy decision to move to universal primary education might be reversed (which seems politically highly unlikely). This is true to a very large extent even when significant proportions of the relevant age groups do not yet complete the primary cycle of education, unless government is likely to adjust the rate at which it expands capacity in primary schools to the relative rate of return on primary education as opposed to higher levels.

Accordingly, at the primary level what is really needed in the way of outcome data is information that more directly speaks to the qualitative connections between the inputs, process, and curriculum of the schools, and the specific desired outcomes of the primary cycle of education, whether they be productivity, teachability in secondary schools, attitudes and behaviors, or whatever. These are basically long-range research questions not necessarily well-suited for in-house policy research by the Ministry or its sub-units itself. Thus at primary level, it is doubtful that it is worth attempting to produce any other indicators of outcomes than those already implicit in attempts to routinely obtain earnings by education data collected by other agencies, in the performance data of primary graduates in the secondary system, in more detailed data on EBTA exam results, and possibly at later stages by sample studies of specific aspects of educational achievement (e.g. in mathematics, language arts, reading) by primary school graduates.

Throughout, the purpose of obtaining such indicators not only at national level but also for provinces, and if possible for lower level units, and also by range data for extreme values, is to obtain information about the range of experience on these indicators within the system. This is not only useful for equity purposes; initially, its primary utility may be in fact in terms of efforts to improve internal efficiency. Obtaining indicators for subunits allows knowledge of current best practice, and of the extent to which other regions lag behind the most efficient areas. It may be unrealistic to hope to bring all provinces up to the efficiency level of the best, because of differences between provinces (and subregions within provinces) in socioeconomic conditions. Nevertheless, data by province could be used to develop target levels of efficiency achievement, or

national norms, to which all provinces could be encouraged to aspire. One might use the third quartile, for example.

2. SECONDARY EDUCATION

2.A. Indicators Derivable from Extant Data

In 1988, the secondary school questionnaire was revised from a six-page format, which requested (but did not always successfully collect) extremely detailed information, to a single sheet, two-page format analogous to that of the primary school questionnaire. Procedures, however, are different, in that from Kabupaten level the completed questionnaires are sent direct both to the Kanwil and to Pusat Informatika in Jakarta, so that Baliitbang Dikbud has the original survey sheets with individual school data available to it.

The entire first page of the 1988 questionnaire is taken up with address and administrative information on the school, the only substantive information requested being accreditation status of private schools, time/number of sessions, and whether practical facilities are at the school or elsewhere. Consideration should be given to whether the degree of detail on schools in terms of addresses, number and date of authorization (SK), etc., really needs to be collected each year.

Available pupil data are limited to enrollment and number of classes by sex, Tingkat and Jurusan, repeaters by Tingkat and sex, and candidates and graduates of the previous year's EBTA by sex and jurusan. No age data are requested or available, and no information on new entrants to form I. No detail on EBTA performance is requested (the 1987 format requested both a breakdown of graduates into those with matric - PMDK - and non-matric level passes, and the average EBTA raw score - NEM - by jurusan). It has been suggested that because of the role of individual teachers and schools in the EBTA exam, the scores are not comparable as a measure of quality across schools, and thus the omission of such questions is sensible. I have no direct knowledge of the nature and procedures of the exam, so express no opinion on this issue.

Personnel data are limited to number of civil servants (teacher and total) by rank (II, III, or IV, no letter subdivisions), number of established foundation-funded teachers (Tetap Yayasan), and number of other teachers. The same divisions are used for non-teaching staff, with no detail on their job titles. The only facility information concerns teaching rooms, number owned by good or bad condition and area in square meters, and non-owned by number and area.

Most of the indicators listed under primary education are also derivable for secondary schools, by jurusan in the case of pupil-years per graduate and graduates per class-year. However, rather obviously age-specific enrollment ratios are not possible without any age data. Because information on repeaters is already collected by sex, the indicators based on pupil progression rates (repeater rates, dropout rates, pupil-years per graduate) can be derived for each sex separately already.

An issue that will be important, but which can only be answered by actual experience, not in the abstract, is the degree of decomposition that the secondary school transition rate data will permit, by province or socio economic location and by type, before the migration/transfer and drop-in problems destroy the validity and usefulness of the results. Only by monitoring the actual data disaggregated to these levels will the degree of inconsistencies and distortions introduced by these factors become apparent. Hence the indicators should be calculated to this degree of disaggregation, even though it should be recognized that they may turn out to be unreliable and unusable for analysis at that degree of disaggregation.

2.B. Indicators Obtainable by Revision of Questionnaire

Because promotion rates in secondary schools are much higher than in primary schools (over 95% in almost all cases), the lack of Tingkat-specific age information is probably not serious. The total lack of age information, however, probably is unfortunate. It could be remedied with a single line on the questionnaire requesting age distribution information, by sex, for the pupil population of the school as a whole. This would permit by province estimates of age-specific enrollment rates for junior secondary and senior secondary (and its components, vocational, technical, etc.) as a whole, and would provide indicators of equity across provinces. If the classification scheme for Kecamatan (or better yet, individual schools) were implemented, then some indication of rural-urban differences might be possible, although the lack of age-specific population estimates for Kecamatan would not permit enrollment ratios to be used for this purpose.

The complete lack of data on teacher qualifications, teacher turnover, and actual hours teaching assigned per week, and whether or not in field, are all a little disturbing. At secondary level, it would be very desirable to be able to express teacher inputs in FTE, and for this information on teaching hours assigned is required; an average for all teachers would be enough. Unfortunately, as previously noted, these data are probably

unobtainable at present, except perhaps for officially part-time teachers and teachers in private schools. It is not easy to see how to get useful information on the extent to which teachers are not teaching the subjects that are their main teaching subjects, although possibly a question asking for an average of time spent teaching out-of-field might work and produce a crude indication of the extent of this problem, and variation in it. Two lines for teacher numbers by whether teacher-trained or not, and by highest educational attainment, might also be worthwhile.

As with primary schools, some attempt should be made to collect fee and contribution information, for both public and private schools. It would be extremely useful information to have, not only because it would give indicators of the share of the cost of education borne by pupils and their families, but also because it would permit better estimates of unit and cycle costs. Given the important role of the private sector at secondary level, some attempt to collect fee information should be very high priority. Only experience will show how easy it is to get reliable fee information from private schools, but there is no reason not to try, and then do some follow-up checks on the quality of the data generated.

2.C. Other Possible Indicators

The most useful information would be on outcomes after graduates (and dropouts) leave secondary schools. This implies two kinds of information, available from three types of sources. First, performance in further study. For those graduates who continue in education, information on whether EBTA score, or any other indicator, is any good as a predictor of performance in further education, would be valuable. This may be obtainable retrospectively from the records of institutions at the next level of education, or alternately it could be sought through tracer studies.

Perhaps more useful still would be information on performance in the economy of those who do not continue with further study, whether graduates or not. Such information can come from two types of source, namely sample surveys conducted for other purposes (such as earnings, employment, or expenditure surveys), so long as those conducting the surveys can be persuaded to use educational categories that correspond to those of interest to DPK, and the results of such surveys are routinely made available in usable form to Balitbang Dikbud; and from tracer studies.

3. HIGHER EDUCATION

3.A. Indicators Derivable from Extant Data

I have not had an opportunity to examine what data may be available in the Directorate General of Higher Education, but I regret to report that from the data collected by annual questionnaire by Balitbang Dikbud itself it is possible to construct only an extremely limited and unilluminating set of indicators. The higher education annual statistical questionnaire is undoubtedly the one that most urgently needs careful review and revision, and this should be made a high priority, given the expense of higher education and its relevance to science and technology, which are heavily stressed for Repelita V. Currently, about the only indicators that could be calculated are registered students per teacher and non-teaching personnel, per square meter of space, and per unit of budget allocation (the first by faculty, the others only by university; the first and second for public and private, the last only for public); and graduates per the same. Virtually nothing else is derivable from the data collected, other than the percentage distribution of academic staff, full time and part time, by qualifications.

3.B. Indicators Obtainable by Revision of Questionnaire

Universities and other institutions of higher education almost always, for their own internal purposes, keep very detailed records, and this fact should be exploited in the redesign of the questionnaire, without unduly burdening the university and other institutions' administrations. The DG of higher education has an extensive MIS system that already collects very detailed information, particularly on student characteristics and budget issues. I have only been able to peruse some of the description of this system (in Bahasa Indonesia fairly quickly, but my impression is that although it collects a great deal of data, it does not support the calculation of some of the indicators discussed below, which do not require data that the universities and other institutions ought to find hard to provide. Obviously duplication should be avoided to the extent reasonable, and some liaison should take place with the DG in the process of revising Balitbang Dikbud's higher education questionnaire, but it is probable that for its own, policy analysis purposes, Balitbang Dikbud will continue to need to carry out its own survey. I will list the kinds of data I believe should be obtainable, together with the kinds of indicator that they would support:

Credit hours (units, "SKS") taken, each semester, average per student by faculty/jurusan/program of study and year (level); average student load.

Credit hours passed each semester, as above; the two together give a pass rate.

Units (SKS) taught per academic staff member; average class size by faculty, jurusan, program, year, permitting inference of student-SKS [equivalent of US student-credit-hours] generated on average by each academic staff member by faculty, jurusan, program, year.

Average Indeks (GPA equivalent) by faculty, jurusan, program, year; cross tabulated with student average load and class size.

Numbers of students academically terminated or suspended (indeks below 2.5) by faculty, jurusan, program, year, number and percentage.

Credit hours (units, SKS) attempted and passed at time of award of diploma/degree, by faculty, jurusan, program; combined with average student load per semester, implies a time to graduation [current data on time to graduation is on time to graduation at institution of graduation, so is an underestimate because it omits all time at other institutions for transfers, who are quite numerous].

Transfer information: as % of all new entrants, credit on transfer, by faculty, jurusan, program.

Especially for private universities, detailed fee information.

4. CONCLUSION

Much data are already available to the Ministry. Currently, they are not routinely transformed into, and presented as, indicators, by province or socio-economic status, that would speak directly to policy issues of efficiency, equity, and quality. For primary and secondary schools, this can be done, relatively easily and quickly, at least for efficiency and equity, with only very minor changes to the current annual questionnaires and data processing procedures.

For quality issues, and for all higher education issues, the situation is different. With respect to quality, it is doubtful whether useful and reliable indicators can be produced without new data collection efforts, which almost certainly should take the form of an institutionalized, regular, annual sample survey of schools involving actual visits (and possibly achievement tests) and both "normal" and "special study" sections. Qual-

ity data of any practical use is extraordinarily hard to obtain; however, given the emphasis on quality improvements in education in Repelita V, if this is not to be interpreted purely as input increases, attempts will have to be made. This would seem to strongly support the initiation of the sample survey for primary and secondary schools.

In higher education, the situation is again different. Balitbang Dikbud at the moment does not ask for the right kind of data. Almost certainly, the institutions of higher education (at least the public and larger private ones) have the data and can provide it without much difficulty; what is needed is for Balitbang Dikbud to ask for it. Revision of the higher education annual statistical questionnaire should have high priority.

In primary and secondary education, the most important recommendations on data collection in my view are:

- 1) to request fee and BP# contribution information.
- 2) to request data on how many teachers are officially part-time and how many hours/week they teach.
- 3) to classify Kecamatan by predominantly urban/rural, and to move toward classifying individual schools by socio-economic status of location.
- 4) for primary schools, to identify repeaters by sex.
- 5) for secondary schools, to ask for minimal information on teacher qualifications.

Similarly, the most important recommendations on indicators are:

- 1) to calculate indicators separately for provinces, types of school, and (when possible) socio-economic status of location. This will not only provide equity information, but is the essential prerequisite to investigating the possibilities of efficiency improvements by policy changes to bring the least efficient schools closer to the efficiency of the more efficient ones. The techniques of such investigation are initially Simple and quite crude: decomposition of internal efficiency indicators such as pupil-years/graduate and graduate/class into their component parts; and cross-section analysis, by scatter diagram or cross tabulation, of potential causative correlations between other input indicators and the internal efficiency indicators.
- 2) to calculate the internal efficiency indicators pupil-years/graduate and graduate/class as suggested above, recognizing that at secon-

dary level they must initially be treated with caution because of the migration/transfer/drop-in problems.

- 3) to initiate, and maintain, a continuous dialogue between those responsible for data collection and those responsible for its analysis for policy purposes, so that each may help the other, and the data collection system over time can evolve into one more suited for policy analysis purposes.

APPENDIX

The following were comments drafted on the basis of the 1987 secondary school questionnaire (a six-page questionnaire), when I was under the mistaken impression that this had not been revised, as it in fact was in 1988, to a single-sheet (2-page) questionnaire more similar to the primary school one than the 1987 or earlier secondary school questionnaire. They are appended here in case they may be of some interest.

2. A. Indicators Derivable from Extant Data

Basically, any data available for primary schools at Balitbang Dikbud is also available for secondary schools, in more detail and with the original data reaching Balitbang Dikbud, not just summaries by Kanwii. Thus all the indicators that can be developed for primary schools can be developed also for secondary schools, by type of secondary school and province and public/private. The secondary school questionnaire already requests repeaters to be identified by sex, so the indicators that were dependent on that addition in the primary schools could already be calculated for secondary schools. Also available are information on new entrants to form I by origin (type of previous school; the same questionnaire is used for both Junior and Senior Secondary Schools), classes and pupils by sex for each form by program of study or stream (jurusan), scholarships by source by form, exam results (EBTA) by jurusan and sex, with average raw score (NEM) for graduates, substantial (and possibly unnecessary on an annual basis) data on teachers and other personnel, much detail on facilities, estimates of average monthly usage (value and physical quantity) of electricity, telephone, water, and gas, and a listing by number of items of equipment and furniture. The only data available from the primary school questionnaire not collected by the secondary school questionnaire is the age distribution of new entrants to form I, but because the repetition rates in form I's in secondary schools are much lower than in primary schools, this is not a serious loss.

Given the extra data, what additional indicators, over and above those already recommended for primary schools, are both possible to construct, and worthwhile to construct from a policy point of view? Some quality indicators based on exam results are obvious candidates: % distribution PMDK (matric), pass-not-PMDK, fail; average NEM score for graduates; both available by sex and jurusan for each school, and therefore cross-tabulatable with indicators of school inputs.

The data on teachers permit some indicators relevant to inputs and internal efficiency. Questions are asked about each teacher's major subject taught ("field"), how much of that they teach [I believe that is the meaning of the question, V.1.(15), although it does not appear well-worded], and how many hours a week the teacher teaches in total. Thus one could construct the equivalent teacher input in terms of a standard for hours taught per week, and also measures of the extent to which, on average, secondary teachers are teaching in and out of field (in %). In principle, there is enough data on civil servant teachers to estimate accurately their salaries and allowances (rank, date of rank, dependents), so that in theory one could calculate output indices on a salary input basis (e.g., graduates per million rupiah of teacher salaries and allowances), actually on a by school basis. However, it is not clear that this would be very useful given current rigidities of teacher allocation, except in as much as variations between provinces and types of school might give some indication of inequities and relative efficiencies. The non-teacher personnel, facility, use of utilities, and equipment data would also probably be most useful to give ratios to output, and percentage of schools with each, across provinces as indicators of degree of inequity in input provision.

2. B. Indicators Obtainable by Revision of Questionnaire

Again, the three most obvious revisions to give additional information are similar to ones on the primary school questionnaire, namely some information on actual attendance as opposed to registration, information on teacher (and other personnel) turnover, and information on fees paid. It is very dubious whether the complete census detail required on personnel should be collected every year, because it must be on file and as the MIS systems develop could be extracted from personnel files as needed via NIP. Full details could just be collected for new hires and separations. However, the information on hours taught per week, and how much of it is in field, should be retained for all teachers, because I am informed that very low average actual hours taught by full time teachers are quite common.

The questionnaire does require revision with respect to how private schools are intended to complete certain sections of it, most notably the personnel ones. It is extremely unclear how detail on non-civil-servant personnel is supposed to be reported, and there are no provisions for reporting method and rate of payment for such personnel. Although the questionnaire in many ways already seems too long [and this is probably an obstacle to accurate and timely reporting], consideration should be

given to introducing separate sections for reporting on civil-servant and non-civil servant personnel, the latter explicitly requesting information on methods and rates of pay. Otherwise, the current questionnaire is extremely comprehensive, and it is doubtful if one should add to it. To the contrary, my advice would be for a careful review to see how it might be shortened (e.g., by collecting only hours taught in and out of field for continuing civil servant teachers, personal details only on new hires, separations, and non-civil servant teachers).

THE PRODUCTION OF ANALYTIC AND RETROSPECTIVE INDICATORS OF EDUCATION IN INDONESIA¹

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1 This paper was originally drafted in May/June 1990 for internal use by Pusat Informatika and EPP/USAID Jakarta staff only. It has been very lightly revised in March 1992 in order to provide a version that can be made available to those who have requested copies of the original, omitting material very specific to EPP and Pusat Informatika and making some very minor editorial changes. Readers should be aware that it was not originally intended for a wide audience, and it remains highly oriented toward the Indonesian situation and not very user-friendly.

INTRODUCTION

This document has its origins in two earlier pieces produced under the auspices of the USAID-funded Educational Policy and Planning (EPP) Project. The first, *Education Indicators for Policy Purposes in Indonesia*. (Cobbe, Balitbang Dikbud, December 20, 1988) is too discursive and insufficiently explicit to serve as an actual, immediate basis for the production of indicators by Pusat Informatika. It was intended to provoke discussion. The second, *An Efficiency-Based Management Information System: A Framework for Accessing and Analyzing Indonesian Education Data*, (McMahon and Boediono, Balitbang Dikbud, 1989) is more explicit concerning possible indicators, but is also very ambitious in its scope and perhaps rather optimistic about the actual and potential availability of basic data. Both these earlier papers owe much to *Indicators of Educational Effectiveness and Efficiency* (Windham, IEES, 1988), and this document has also taken some ideas from *Analytical Tools for Sector Work in Education* (Mingat and Tan, Johns Hopkins/World Bank, 1988).

This document attempts to do three things:

- 1) **Suggest sets of indicators** that can be produced either immediately, soon, or eventually, for two different purposes: forward-looking, analytic- motivated, indicators for tracking progress in the system and evaluating that progress; and backward-looking and comparative indicators, for seeing long-run trends and comparing Indonesia to other Asian countries, neighbors and competitors.
- 2) **Give sufficient information** that it is clear exactly what is meant by the indicator and how it would be calculated; and where not obvious, make some suggestions about sources of data.
- 3) **Make some suggestions** about use and meaning of the indicators in cases where this is not obvious.

In this document there will not be a long discussion of the motivation behind each suggestion, nor will there be much consideration of the underlying data quality issues (which in many cases are serious and should not be neglected). Each indicator will be followed by a brief comment on its construction (i.e., how it should be derived from the available data), and a brief discussion of its relevance for policy purposes.

It should be noted that many of the indicators suggested are at best very indirect reflections of the characteristic of the educational system that we wish to know about. This is, unfortunately, currently inevitable. Some

of the characteristics in which we are interested (most notably efficiency and quality) are hard to define, let alone measure directly. Without an agreed definition of quality, only indirect (largely input measure) indicators of quality are possible. Similarly, the aspects of efficiency that can be reflected in indicators are very limited without an agreed definition of the concrete objectives of the educational process, and baseline measures of entry-level standards and achievement during education, which would be required to measure educational value added. Accordingly, the efficiency measures have to be indirect ones, "internally" reflecting quantitative output-to-input indicators assuming quality remains constant; and "externally" relating educational attainment to labor market conditions. This of course produces the somewhat paradoxical situation that some indicators suggested for use as efficiency measures are the inverses of closely related indicators suggested as measures of quality. This comes about because of the need to use indirect measures in the absence of direct measures of quality (e.g., reliable achievement test scores). On the quality side, we assume that quality is enhanced if inputs per unit of output increase; whereas on the efficiency side, we assume quality is constant and that efficiency has increased if inputs per unit of output go down. This paradox is unavoidable and emphasises two important conclusions:

- 1) Some continuing and reliable technique for assessing and monitoring educational quality (e.g., appropriate achievement tests administered to samples of graduates) would be highly desirable; I understand that a national achievement test is being developed, to be launched initially in three pilot provinces, to be implemented in future years. This may eventually give a reliable indicator of achievement and quality.
- 2) It is essential that indicators be interpreted intelligently by analysts who understand what they are doing and why; mechanical conclusions from imperfect, indirect, indicators such as those suggested in this document may be highly misleading. The reasons for this are illustrated by the example of average pupil/teacher ratios: these are quite low, particularly at secondary level, in Indonesia. However, (a) many teachers spend less than the notional full-time-equivalent in the classroom, but we have no data on actual time on task by teachers; (b) therefore, changes in pupil/teacher ratios may not in fact change the average number of pupils in each classroom with one teacher actually on task, if reductions in pupil/teacher ratios result in teachers on average spending less time on task; and (c)

empirical evidence from other countries suggests that the impact of changes in pupil/teacher ratios in the relevant ranges (roughly 20 to 45; class sizes below 15 do have a positive effect on achievement, but are very expensive to maintain) on pupil achievement are small or negligible; it would be wrong to conclude that the low pupil/teacher ratio in secondary schools and some primary schools in Indonesia indicates high quality. Further, it would not necessarily be correct to assume that a lower pupil/teacher ratio would indicate improved quality in these circumstances. The first might be better interpreted as low efficiency, the second as a reduction in efficiency. *C. Mangindaan Moegiadi and W. B. Elley, National Assessment of the Quality of Indonesian Education* (Balitbang Dikbud, 1976) found that primary schools with larger and more classes were more effective than very small schools with only one class in each grade and low pupil/teacher ratios.

Presentation:

The idea behind these suggestions is to produce a very brief set of summary numerical indicators and charts that reflect the situation of the education sector, and trends therein, presented in a manner that is easily understood and has relatively immediate policy implications that are relatively obvious. With this in mind, many of the suggested indicators lend themselves to the calculation of a "target", "desired", or "theoretically ideal" value. The intent is that the presentation can array the actual numbers alongside this "target" or "ideal", and graphical presentations can depict progress toward it. For example, in a time series, line graphs could be drawn for the various levels and state/private/total, with all scaled to the target being 100 and that shown as a horizontal bar (or if the target is changed over time, the target of a base year being 100 and the target appearing as a step-function with various horizontal portions corresponding to the targets for different time-periods); or the data for a single year for the various levels of education and state/private/total could be depicted as a histogram, again with everything scaled to the targets being equal to 100. Such charts could then legitimately be labelled "percentage attainment of target" or "percentage attainment of ideal", which it is hoped would make them more meaningful to a lay audience.

Another presentation area, on which this document is not fully satisfactory, concerns the number of indicators to present. The full list appended, although all may be useful for internal Pusat Informatika purposes, is probably much too long for useful presentation to outside

audiences. Even the "immediate" indicators alone are probably too many in number for a short booklet intended for outside, lay, use. However, the final choice will initially be strongly influenced by which indicators it is in fact possible to calculate, and in any case would seem to be an editorial function properly assumed by Pusat Informatika staff themselves, not by an outside advisor.

Equity Issues:

By equity in education, we mean fairness between distinguishable groups in terms of access to, participation in, and achievement in, the education system. To measure equity, therefore, we must have data that distinguish between the groups among which we wish to ensure equity. Possible characteristics by which to distinguish groups for equity purposes include sex, male or female; place of residence, e.g., rural/urban or by province; and possibly others, such as socio-economic status, ethnic group, home language, or religion.

With current data, it is not possible to suggest much in the way of direct equity indicators, because the only cleavages in the population by which data are often available are male/female and province. Some breakdown by socio-economic characteristics of the geographic location of the school would be very desirable, but is not yet easily available to my knowledge. "Education Indicators for Policy Purposes in Indonesia", Cobbe, December 20 1988, suggested attempting to classify at least Kabupaten, more usefully Kecamatan, and ideally individual schools as urban or rural, or even better metropolitan/urban/peri-urban/rural/remote; however, it does not appear to have been possible to implement this suggestion as yet. However, some data are available on a rural/urban basis from BPS surveys such as SUSENAS, and are published for earlier years (e.g., 1987). Where BPS data exist on a rural/urban basis, they should be included in the indicator system to the extent possible, even if they are not as up-to-date as the Pusat Informatika data themselves.

Interprovincial Equity:

However, most data are available by province, on some dimensions interprovincial variation is greater than might be expected, and interprovincial variation is an aspect of equity which is of interest (although it is important to realise that intraprovincial disparities are likely to be greater than interprovincial ones). However, publication of data for all 27 provinces typically produces either a mass of pages or densely packed tables which have little immediate meaning to the reader. It is suggested here

that all those indicators that are easily calculable by province be calculated for each province, and these data should of course be used by Balitbang Dikbud internally for policy purposes, but that in terms of presentation for outside readers, the most useful way to present information on provincial variation would be to present the provincial range of the indicator along with the Indonesian mean, in a special section on provincial variation. The means and ranges should be presented both in actual numbers (the units used for the indicator), and also (at least in graphic presentations) scaled so that in all cases the Indonesian mean has a value of 100. This will permit easy comparison across indicators, levels of education, and state/private to see where interprovincial variation is greater and less. Throughout what follows, those indicators that I believe are easily calculated by province, and which therefore should have their ranges (maxima and minima by province) reported compared to the Indonesian mean, in this special equity/interprovincial variation section, are marked with an *. Consideration should be given as to whether it would be desirable to report the names of the provinces that have the maximum and minimum values on each indicator in that section. Where a single province is a clear outlier, it may also be worthwhile to show range and maximum and minimum values with the outlier province excluded, noting that fact (and the value for the outlier).²

The structure of what follows is as follows. There are three main sections, labelled **I. Analytic**, **II. Longitudinal**, and **III. Summary Listing**. The first discusses indicators suited to forward- looking analytic purposes; the second, indicators suitable for review of trends over time and comparisons with trends on the same indicators in other countries; and the third is simply a recapitulation of all the indicators discussed, with brief comments on calculation where this seems useful. In each of the first two sections, there is a subdivision into indicators of 1. efficiency, 2. quality, and 3. equity. In the first section, each subdivision is further divided into (i) Immediate, (ii) Soon, and (iii) Eventually, on the basis of judgements about data availability and analytic burden of production. In the second section, a fourth subdivision "descriptive" is inserted at the beginning of the section. Each indicator is accompanied not only by a definition, but some discussion of purpose and use, and difficulties of production and interpretation, where this seems likely to be helpful. These

2 In the original draft, at this point there were several paragraphs on data availability in Pusat Informatika, both of Indonesian data and for international comparison purposes, together with suggestions for how to remedy some of the deficiencies. These paragraphs are omitted from this version as being irrelevant to anyone other than officials in Indonesia.

discussions are not repeated where the analogs to earlier discussions seem likely to be obvious to the reader, with the result that the amount of discussion accompanying each item tends to decrease as one moves through the document. The implication, however, is that the document should be treated as a whole; reading later segments alone a reader may not be aware of relevant discussion that came earlier.

I. ANALYTIC

The following indicators are proposed for analytic purposes, i.e. for purposes of tracking where the educational system is now; giving early indications of necessary policy responses to keep it moving in the desired direction; and monitoring progress in achievement of objectives. They are divided into groups on two bases:

- 1) into indicators of efficiency, quality, and equity; and
- 2) according to the feasibility of production of actual numbers, given data availability and staff effort required, into "immediate", "soon", and "eventually".

I.1. Efficiency

The concept of efficiency is borrowed from engineering and economics. In both disciplines, it refers to the endeavor to get the most output from given quantities of inputs. Thus measures of efficiency ideally are quantitative ratios of output to input in some form. The concepts differ between engineering and economics in that in engineering the concept is generally thought of initially in physical or technical terms, e.g., an electrical generator's efficiency is measured as the percentage of energy supplied as input available for use as electricity output. The corresponding efficiency concept in education is labelled "internal efficiency," and refers to getting more educational output from given quantities of educational inputs. In economics, attempts are made to value both inputs and outputs, and efficiency then refers to the ratio of the value of output to the value of input (because of the time dimension, often expressed as a percentage rate of return, i.e., the interest rate that would equate the present value of discounted output values to the present value of discounted input values). In education, economic efficiency is usually referred to as "external efficiency," the idea being that the measurement of efficiency in this case is based on the valuation of educational outputs (and inputs, too) by the world outside the educational system itself, i.e., the wider economy.

It is usually assumed that it is unlikely that any enterprise, and particularly an education system, is operating at maximum feasible efficiency. Hence there is an expectation that it is possible to improve efficiency, and this requires indicators or measures of efficiency in order to know what is currently being achieved, and how efficiency differs between parts of the system (which can then suggest areas that are good candidates for expansion [the more externally efficient], and other areas that are ripe for reform or adjustment [because they are internally or externally less efficient]).

However, direct measures of efficiency in education are extremely problematic. For internal efficiency, the problem is simple: the inputs and outputs of education are heterogeneous, and therefore we cannot produce simple ratios of output to input measured in the same units, as we can in some engineering problems. We do not have agreed ways to aggregate the heterogeneous inputs and outputs. For external efficiency, there is in principle a solution, namely the calculation of internal rates of return on the assumption that we can place money values on all relevant inputs and outputs. However, this too is fraught with practical difficulties, concerning (a) valuation of inputs and outputs, (b) correct assignment of what proportion of increased earnings of the more educated is properly attributed to the educational inputs used rather than to other characteristics of the individuals in question or their life experiences, and (c) accurate predictions of lifetime relative earnings streams, a particularly difficult and inherently uncertain activity in a developing country with rapidly changing economic structure and educational attainment of its labor force.

As a result, apart from estimates of internal rates of return to education (which are the ideal external efficiency indicators, but which are time-consuming and expensive to calculate initially and always remain highly uncertain with large error margins -- although once done, recalculation, e.g., on an annual basis when new data become available, may be relatively simple), all indicators of efficiency in practice have to be indirect and partial indicators, because of the impossibility of aggregating inputs and outputs.

Typically, indicators of internal efficiency relate to aspects of (usually partial, e.g. single output, single input) output to input ratios, using simple physical ratios that are not necessarily measured in the same units, e.g., graduates/teacher; or to characteristics of the education system that have known and predictable relationships to physical output/input relation-

ships, e.g., repetition rates (the higher the repetition rate, the fewer the educational outputs for given inputs).

Indicators of external efficiency, apart from internal rate of return estimates, are of two kinds. One relates educational outputs to the value of inputs, e.g., unit costs per graduate, or unit government expenditures per graduate. The other kind of external efficiency indicator summarises information from the labor market on the effects of education on labor market experience, to give an indirect indication of the value the economy is placing on the outputs of the educational system. If full information of both kinds is in place, one is in a position to compute internal rates of return. However, the indirect measures themselves are of use, especially because of the inherent uncertainties in rate of return estimates.

(i) Immediate:

a. *Repetition rate, by level, total and state/private**

This is already calculated and is easily understood. It is important that the definition of repetition used in data collection corresponds to the one the analysts want. For macro-efficiency purposes, we are interested in the percentage of children who start a given grade (*Tingkat* in Indonesia) one year and who enroll in the same grade the following year. For macro-efficiency purposes, it is unimportant whether the reason they are not in the next higher grade the following year is because they finished the grade, but were not promoted, or because they never finished. Educators, and particularly those interested in the amount of learning occurring in schools and promotion criteria, may be very interested in more strictly defined repetition concepts, such as the percentage of those who finish a given grade and who are not promoted to the next, and may have less interest in those who never finish the year and therefore automatically are not promoted. However, from the point of view of the system as a whole and how it is serving whole cohorts of children, it is the broader concept -- the percentage of those who start a grade and who are not in the next grade, but are in the same one a year later -- that is of interest.

Consideration should be given to reporting the repetition rates for first and/or last years (especially for SD, *Sekolah Dasar* -- the Indonesian acronym for primary school) as well as overall level rates, because often these rates are markedly different from averages over the other years of the cycle. This is a conventional indicator of internal efficiency and is easily understood. The ideal value is presumably zero, although possibly one could argue that some children should repeat some years. This is a

good example of where the "target" may not sensibly be set equal to the "ideal", in that a "target" usually implies a value that can feasibly be reached within a reasonable (and perhaps stated) period of time. Setting the "target" thus becomes a policy decision: what is the level of repetition, at each level, that from the point of view of educators, would be desirable to reach, either in the next five years or the next twenty-five years?

The next group of indicators are all what I have called "one-year". By this I mean they should be calculated in year X based just on the actual data of the numerator and denominator in that year's statistics (as opposed to similar indicators, in the "soon" category below, which should be calculated on a "cycle" basis, i.e. based on the implied transition matrices from the data for year X). These indicators are quickly and easily calculated, and fairly easily understood as to their apparent meaning. However, because they are crude in that they do not reflect the full effects of either population growth, changes in enrollment ratios, or changes in repetition and drop-out rates, for analytic purposes they are less useful than the cycle versions that are listed under "soon". Accordingly, both should be calculated as soon as possible, and differences between the one-year and cycle versions will, in themselves, be useful summary indicators of changes underway in the system (for analytic purposes, it will be necessary to decompose the causes of differences into their component parts).

*b. Completion rate, by level, total and state/private, actual one-year on-time**

For a level of education of normal length N years, this simply takes in year X the number of graduates and divides it by the enrollment in Tingkat 1 of the level in year $(X - N + 1)$, and multiplies by 100 to give a percentage.

The formula depends on how graduates are reported. The formula given is based on the assumption that graduates at the end of, say, the 1989/90 academic year are reported in the 1989/90 data. If, as happens in Pusat Informatika data, they are reported in the 1990/91 data, the formula should be "divided by enrollment in Tingkat 1 of the level of education in year $(X - N)$ ".

In a steady state with no drop-outs or repetition, the "ideal" value would be 100. Values below 100 reflect repetition, drop-outs, and transfers. Values above 100 could be possible, particularly by province or type of school within a level, if there is geographic movement, transfer between

types of school, or abnormal "dropping-in" (i.e. return to school after time out of school by former dropouts). This is an easily understood measure of what proportion of entrants to a particular level and type of school graduate from it on time. Of course, it does not actually measure that because some of the graduates in year X will not have entered that school in year $(X - N + 1)$, because they will have repeated, dropped-in, or transferred after class 1, but for initial purposes this does not matter much.

*c. Pupil-years/graduate, actual 1 year, by level, total and state/private**

In year X, this takes graduates from the given level and type of school in year X and divides into total enrollment in that level and type of school in year X.

The ideal or target value here is a little more complex. In a steady state with no population growth, no changes in enrollment ratios, no repetition and no dropouts, the ideal value would be the number of years to on-time graduation in the level of education. However, actual numbers will be considerably higher in most developing countries, including Indonesia, because there is population growth, there is normally growth in enrollment ratios, there are dropouts, and there is repetition. All these tend to raise the value of the indicator. The target could be calculated on the basis of known demographic data (age structure of the relevant population group), desired changes in enrollment ratios, and target values for dropouts and repetition (both of which could be zero, although at most levels this is probably unrealistic). For analytic purposes, it will be important to decompose changes in this indicator into how much (and in what direction) is attributable to changes in population growth, changes in enrollment ratios, changes in dropout rates, and changes in repetition. After allowance for population growth and desired changes in enrollment ratios, an increase in this indicator indicates a fall in internal efficiency. Because of the difficulty of explaining how the indicator is influenced by population growth and enrollment ratio changes, this is a good example of where charts for outside consumption could usefully scale target values to 100 and present the indicator as percentage achievement of the target.

d. Graduates/class-year, actual 1 year, by level, total and state/private

In year X for a particular level and type of school, the number of graduates from that level and type of school divided by the number of classes in that level and type of school that year.

In a steady state, the ideal or target value would be the desired class size in that type and level of school, divided by the number of years to normal graduation in that type and level of school. It is reflecting the inverse of the number of classes that have to be staffed and provided in order to produce a graduate from that level and type of school. In practice, particularly when enrollment is growing and dropouts and repeaters are present, it is unlikely that any given class size can be achieved uniformly within the different years of a given level, class size typically falling with increasing number of years within the level, except where there are more classes (streams) in the earlier years than later years (typical of large schools). Deriving a target depends on a policy decision on desired class size; actual values will depend on internal efficiency in terms of dropouts and repetition, population growth and changes in enrollment ratios, and internal efficiency in terms of distribution of pupils across schools. The higher the number, other things equal, the more internally efficient the schools. It is likely that sparsely settled rural areas will have lower numbers than more densely settled and urban areas, so the interpretation of provincial variation will require care; it is likely that the values in some outer islands will be lower, but that this will reflect inevitable tendencies to higher costs arising from the inherent lumpiness of the educational process, i.e., you cannot have less than one class of a given level in a school unless you have none.

*e. Graduates/teacher-year, actual 1 year, by level, total and state/private**

In year X, this is simply the number of graduates from the particular type and level of school, divided by the number of teachers employed that year in that type and level of school.

Eventually, one would hope that teachers would be measured in FTE (full-time-equivalent) units, but this is unlikely to be possible for some time. This is a crude measure of average teacher productivity in the sense of producing graduates. It totally neglects the educational output of the schools embodied in those students who do not graduate, but there is nothing obvious that can be done about this except by measuring output by total pupil-years produced. It differs from d. above in that there are typically more teachers than classes, reflecting teaching loads that are lower than pupil loads. d. is a measure of actual need to staff classes to produce graduates, this is a measure of how many teachers actually were in place to produce those graduates (both as inverses); the ratio of the two

therefore is a crude measure of teaching loads (time in class) relative to pupil loads (time in class).

Similarly to d. above, where the target depends on desired class size, here the target depends on desired pupil-teacher ratio, and thus the target value cannot be determined without a policy decision on the desired pupil-teacher ratio for each type and level of school. For similar reasons to d., the ideal steady-state value is unlikely to be actually attainable because of dropouts, repetition, population growth, increases in enrollment ratios, and the lumpiness of teachers (affecting more the smaller schools, and thus the more sparsely populated areas). Other things equal, the higher the value, the more productive the teachers. However, it is important to remember that the implicit assumption here is that the quality of graduate is fixed; an indicator related to this one, pupil/teacher ratio, will be suggested as an indirect quality indicator, and obviously one cannot have improvement on both simultaneously (the assumption here is that if this indicator increases, teachers are more productive (quality of graduates assumed fixed); but if pupil/teacher ratio declines, the quality of education (and presumably graduates) is usually assumed to have gone up. However, see also comments below on problems with pupil/teacher ratios as measures of quality and the high probability (extrapolating from empirical work in other countries) that over large ranges which include those likely to be observed in most of Indonesia, quality does not change measurably with changes in pupil-teacher ratios or class size).

f. Available public and private expenditure and cost data

Most cost and expenditure data are placed under "Eventually" below because they are not immediately available. However, I believe there are a few exceptions, and these should be included in the indicator system even though they are less than ideal and are incomplete. For example, budget data are available, even if they are not broken down by level in the way the analyst might prefer. Attempts should be made to reconstruct from the available budget data (preferably with the assistance of other parts of the Ministry) central government expenditure by level of education, and hence by pupil registered by level. It might also be useful from a longer run point of view, perhaps, to go through the BPS data (published, about two years after the fact) on Province, Regency, and Village finances which do show development expenditures by subsector (including education), although not recurrent expenditures that way (only by type of expenditure [wages, repairs, etc], not field).

Turning to private expenditures on education, some indicators are immediately available and should be tracked regularly by Pusat Informatika even though they are neither ideal nor complete. For example, the new "Indeks Harga Konsumen 27 kota dan perubahannya" is published monthly in BPS's *Buletin Ringkas*, and includes a figure for the price index for "Pendidikan" for each of the 27 provincial capital cities. The April 1990 data show the wide disparities in rates of inflation on education items (basically fees, pencils, ballpoints, notebooks, etc., I believe -- the detail is available in *Diagram Timbangan Indeks Harga Konsumen Hasil Survei Biaya Hidup 1989 di 27 Ibukota Provinsi* (BPS, 1990), although apparently not a "sale document" -- BPS staff assert the document is only available from the BPS section that produced it, and it cannot be purchased). On an April 1988 to March 1989 as 100 base, in April 1990, the education component of the index stood at 114.20 for the 27 provincial capitals taken together, but varied from a low of 100.38 (in Padang) to a high of 138.91 (in Ujung Pandang). By December 1991, the range was from 103.07 (in Denpasar) to 153.74 (still in Ujung Pandang). Rebasings to April 1990 equal to 100, that is a range from 87.9 to 121.6 only eighteen months after levels were equal at 100; for December 1991, the range had widened further to 80.7 to 120.4. Pusat Informatika should definitely be keeping track of this price index of household education expenditures in provincial capital cities and including it in its indicator set.

(ii) Soon:

The suggested indicators that follow are all versions of ones listed under (i), but based on the transition rates implied in year X from year (X - 1) for promotion, drop-out, repetition, and graduation. In order to give indicators of the current status of the education system, it is proposed that these "cycle" versions of the indicators be calculated with these transition rates of year (X - 1) to year X *assumed to hold constant*, not on the basis of actual progress of real cohorts through the system. The latter is also of course obviously possible, but is more intensive of staff time to calculate, will change less from year to year, and reflects the cumulative pattern of transition rates over the past decade (in the case of SD, allowing for repetition) rather than the current situation. It is therefore suggested that the current transition rates ONLY be used, on the assumption that they will hold constant (of course they will not, but this is what we are interested in -- the eventual implications of changes from year to year in the transition matrix).

*a. Completion rate, by level, total and state/private, implied cycle final**

For each level and type of education, this traces a hypothetical cohort through the level from entry until each member has either graduated or dropped out, including tracking repeaters, assuming that the transition rates implied by the most recent data remain fixed, and calculates for that transition matrix the percentage of the cohort who will eventually graduate (not all on time, because some pupils who repeat will graduate in later years than the year they should have if they graduated on time). The methodology is very similar to that used for calculating pupil-years per graduate used in the production of cycle costs. The calculation is best carried out in a spreadsheet, following a notional cohort of 1000 entrants to the level of education through the number of grades in the level, but for some arbitrary (e.g., five) number of years greater than the number of grades, to allow for repetition. The normal assumption to make is that the transition matrix not only stays fixed, but is the same for repeaters as for first time enrollees in each grade. This is obviously not very realistic, especially after the first repetition, but is a reasonable assumption to make for an indicator of internal efficiency that does not pretend to reflect actual experience of real cohorts of pupils. For purposes of policy toward what actually goes on in schools, it may be useful for grades that have very high repetition rates (e.g., Tingkat 1 of SD, primary one in Indonesia) to actually mount a data collection exercise to find out what does happen to repeaters as compared to first time enrollees -- the expectation should probably be that the repetition rate (i.e., second repetitions of the same grade) falls, promotion and dropout increase, compared to first timers. One of the most striking features of Indonesian educational statistics is the remarkable stability of repetition rates (at high levels) in primary schools over the last twenty years. Once the spreadsheet is set up for the calculation for each level of schooling, recalculation for new data for a new year is very simple and can be done by relatively unskilled staff in a fairly mechanical way. It may also be helpful to illustrate the impact of repetition by contrasting the number of on-time graduates (after the number of years equal to the number of grades in the level) to the total number of graduates from the same cohort five years later, allowing for the impact of repetition.

The ideal value of the final completion rate, including late graduation caused by repetition, is again presumably 100, which implies zero drop-

outs. This is therefore unrealistic and a lower target allowing for a policy-determined acceptable level of dropout may make more sense.

*b. Pupil-years/graduate, "cycle", by level, total and state/private**

As in a. above, the total number of pupil-years of attendance in the level and type of school for a hypothetical cohort moving through at the assumed- fixed transition rates from the most recent data, divided by the number of eventual graduates from the cohort calculated in a. above.

This represents the number of pupil-years of attendance at this type and level of school required, at current transition rates, to produce one graduate.

The ideal would be the normal time to graduation in this type and level of school, which would imply no dropouts or repetition. For medium term purposes, it might make sense to calculate a target based on target values for dropouts and repetition.

*c. Graduates/class-year, "cycle", by level, total and state/private**

This is similar to the two that precede it, except here we use the current year's average class size as well, so that in tracking the cohort (including repeaters) through the level and type of school using this year's transition matrix (assumed fixed), after getting the numbers of pupils in each Tingkat for each hypothetical year, we divide by the average class size for that Tingkat this year, again assumed to remain fixed.

In this way, we get the number of graduates produced at current rates per class-year, the inverse of which is the (fractional) number of staffed/equipped/housed classes that must be provided at current rates to produce one graduate from the level and type of school.

The ideal value depends, as in I.1.(i)d. above, on normal time to graduation and desired class size, but is also affected by dropout and repetition rates. The higher the number, the more efficient the system, other things equal.

d. Graduates/teacher-years, "cycle", by level, total and state/private

Again, similar to the preceding indicator and the equivalent "one-year" version; this time using current values of the pupil/teacher ratio by Tingkat and type and level of school to calculate the number of graduates produced eventually per teacher-year in this type and level of school, assuming the transition matrix and pupil/teacher ratios remain constant.

The ideal value depends, similarly to above, on normal time to graduation and desired pupil/teacher ratio, but is also affected by dropout and repetition rates. It is a slightly better measure of teacher productivity than the one-year version, in that it does at least take account of repeaters who eventually graduate, but it still gives no credit to teachers for whatever education may have been imparted to those pupils who dropout prior to graduation.

(iii) Eventually:

a. Unit costs and cycle costs, real terms and GNP/head units, by level, total and state/private

Work on collecting cost information should obviously continue, but currently there appear to be too many holes in the data to be confident of producing worthwhile numbers in the short run. Their production should remain a long run objective, however. When they do become available, it will be important to choose appropriate units for purposes of comparison over time and with other countries. Rupiah figures should be deflated by a suitable price index; in practice, it will probably be necessary to use the consumer price index because it is the only relatively broad-based price index which is available at all quickly. The GNP/GDP deflator, or the government services component thereof, would probably be better, but this is usually only available after a relatively long time-lag. For comparisons with other countries, the real terms figures should be converted to index numbers on a common base year as 100; and measures in GNP/head (or GDP/head) units should also be used, although there will inevitably be some time-lag before such data can become available (it would not be surprising if this measure for other countries was three years out of date, whereas it should not take much more than a year to produce this number for Indonesia itself, once data collection systems are in place to gather/allocate the cost information on a continuing basis). The reason for advocating use of GNP/head units is that one would expect average teacher salaries to bear some systematic relationship to GNP/head (i.e., other things equal, as real GNP/head increases in a given country, one would expect real average teacher salary in that country to increase). Because teacher salaries are such a large proportion of educational costs, country-specific index numbers of unit or cycle costs will be misleading for international comparisons to the extent that growth rates of GNP/head differ between the countries being compared; the use of costs measured in GNP/head units removes this source of distortion from the comparisons. The use of GNP/head units thus increases the probability that any diver-

gences in trends in unit or cycle costs between countries reflect a real phenomenon, not just an artifact of differing economic growth experience.

b. Rate of return estimates by level and type of school

In the long run, these should be updated whenever new earnings by education and age data become available, although (as noted under c. below) there are real problems of interpretation involved in a situation where the educational composition of the labor force is changing rapidly.

c. Relative wages/salaries by education level

Comparison should be with "belum SD" (not yet completed primary school) level, because although there are still many persons without education in the labor force, very few new entrants to the labor force are in the "no school" category.

Susenas and other BPS surveys contain wage/salary and/or household or individual expenditure (perfectly acceptable as an approximation to earnings) data by education level or education of household head, on a fairly regular basis, and these relative wage/salary/expenditure ratios should be tracked. If possible, one would like to compare earnings of fixed groups with comparable other labor force characteristics (age, sex, residence), but if this level of detail is not available the crude overall ratios are better than nothing, and wage/salary data are usable in place of earnings data. Earnings data would be much better because the wage/salary data are on usual net wage/salary rather than actual earnings, and only cover the roughly one-quarter of the labor force in formal employment, omitting the various categories of self-employment and family labor that account for significant proportions of even secondary level educated new labor force entrants.

Interpretation is complex, and it is important not to misunderstand the meaning of the indicator. One *expects* this ratio, e.g., earnings of SMA (completed high school) divided by earnings of belum SD (less than full primary) to decline over time, as the relative proportion of the labor force with more education increases. The issue is to watch the rate at which the ratio declines, to obtain advance notice of possible oversupply of particular categories of graduate if the decline suddenly accelerates. Note that because one expects relative earnings of the more educated to decline over time as persons in the labor force with that level of education become relatively less scarce, estimates of rates of return based on age-earnings profiles from cross-section surveys are very likely to be upwardly biased

ex post, and not too much reliance should be placed on them in periods of rapid expansion of the educational system.

I emphasise again that although the discussion above refers loosely to "earnings," the most frequently available BPS data are actually for "rata-rata upah/gaji bersih pekerja/karyawan selama sebulan," i.e., net average monthly wage/salary for employees, and only cover the roughly one in four members of the labor force who are in employee status (the actual percentage in 1987 was 26.55%; the remainder are self-employed, casual workers, or unpaid family workers, plus a small number of employers). Accordingly, movements in these ratios should be interpreted with great caution, because they do not reflect the earnings of the bulk of the labor force who are not employees.

d. Proportion of the economically active population with given educational qualifications looking for work, never having worked

Again this information is available from BPS surveys, usually some time out of date, and gives some indication of supply/demand relations at different levels of education (although it may also reflect aspirations for type of employment and preferences with respect to place of residence of the individuals involved). The "never worked" category is probably more useful than the total number, because it reflects the experience of recent school leavers. Not published, but derivable from the BPS data collected in Sakernas, is the length of time spent looking for work before first employment, on average, for different levels of education. This also could be an indicator worth watching for trends, although it may be sensitive to short run macroeconomic conditions (influencing the willingness of relatives to finance unemployment for those who have never worked, i.e., in "bad" times family members may pressure graduates into self-employment or unpaid family work earlier than in "good" times, resulting in this indicator reflecting macroeconomic conditions rather than the external efficiency of the level of education.

e. Labor force status of the economically active by educational attainment

1987 data show a perfectly monotonic decreasing percentage of the economically active with given educational attainment in the combined categories self-employed, self-employed assisted by family worker/casual labor, and unpaid family worker, as educational attainment increases (the percent declines from 84.1% for those with no education to 9.8% for those with university). There is a similar monotonically increasing percentage

of those who are employees (from 15.6% for those with no education to 88.6% for university) the omitted category is "employer", for which the connection with education is not monotonic. Although it reflects changes in the structure of the economy and the labor force at least as much as the external efficiency of the education system, I suggest that these two percentages (relative to the mean for all educational attainment classes, expressed as an index with the mean equal to 100) would be a useful indicator of the external efficiency of education in terms of its impact on the probability of getting a job, (i.e., becoming an employee) as opposed to making a living in the household/informal sector (self-employed, family worker). The usefulness of the indicator of course depends on the consistency with which such data are collected, and it is important to recognise that the different BPS sources are not consistent with one another (specifically, Sakernas, the labor force survey, is wildly inconsistent with Census data; it is essential, therefore, that Sakernas and Census data not be compared with each other. As an example of the kinds of indicator that could be produced, 1987 data suggest that with the Indonesia mean for all educational attainment classes at 100, the relative probability of being employed varies from 58.8 for those with no schooling to 334 for those with university, whereas the relative probability of being in the household/informal sector varies from 115 for those with no schooling to only 13.5 for those with university.

*f. Total enrollment rates, by level and public/private**

Net Enrollment rates take enrollment of pupils of the appropriate age in a given level of education, and divide by the total population of that age group. Gross Enrollment rates take total enrollment in a given level of education, and divide by the total population of the age group appropriate to that level of education. The Total Enrollment rate takes the total enrollment in all levels of school by pupils of the age appropriate to the level of education in question, and divides by the total population of the age group appropriate to that level of education. Where there is substantial repetition and over-age initial enrollment, net enrollment ratios give a very misleading impression of the proportion of the population of, e.g., SMP and SMA age groups (Junior and Senior secondary school) actually enrolled in schools. For example, the World Bank using SUSENAS 1986 data calculated the following:

13-15 years old (SMTP)	Net Enrollment Ratio	Total Enrollment Ratio
Male	41.6%	76.6%
Female	40.4%	72.9%
Total	41.0%	74.8%

16-18 years old (SMTA)	Net Enrollment Ratio	Total Enrollment Ratio
Male	27.8%	51.8%
Female	25.4%	42.7%
Total	26.6%	47.3%

This reveals two significant facts about school attendance among 13 to 18 year olds: first, much higher proportions of the age group are in school *at some level* than suggested by the net enrollment ratios; second, that there is a much greater difference between girls and boys in their school attendance behavior in these age groups than suggested by the net enrollment ratios. Both facts are of some policy significance, and are hidden by reliance on gross and net enrollment ratios.

However, routine calculation of this total enrollment ratio depends on either collection of age data on pupils routinely from secondary schools in the annual census questionnaire to schools, (the data are already collected for primary schools, although there may be reason to question both how accurately the question is answered and how complete the aggregation -- only the aggregation is received by Pusat Informatika -- is carried out), or access to data on school attendance by age and sex from SUSENAS whenever the question is asked. Note that age by grade data from schools can be useful for other purposes; the difference between mean age of actual enrollees in different grades can be used as a check on the quality of repetition and dropout data, by comparison with the implied average years of school attendance by grade (and hence differences between mean ages by grade) contained in the calculations of the cycle cohort exercises called for by indicators such as I.1.(ii)a. etc. above. It would be desirable to calculate and make these comparisons for primary schools on a regular basis. Mean age by grade is likely to differ by rural/urban and province and the variation may be quite revealing.

I.2. Quality

Quality is very difficult to define in an operational way in education. One ideal approach would be to define a clear set of quantitatively-

measurable objectives for the education system, and then quality would be definable as quantitative attainment of those objectives. Practical problems arise with this approach because:

- objectives of the education system are typically multiple;
- opinions on what those objectives should be, and how much weight should be given to each, often differ;
- some objectives can not be measured quantitatively in an easy way, if at all (e.g., changes in attitudes, adaptability to change);
- objectives frequently differ between different levels and types of school, and may also differ between different groups within the population (e.g., rural and urban populations may have different objectives they hope to see achieved by their primary schools).
- often there are no data on the before-education achievement level with respect to objectives, only data on after-education achievement; as a result there is no way to know how much has been caused by education, how much was there before, or how much was attributable to experiences other than formal schooling.

Ignoring the difficulties arising from qualitative objectives and possible differing perceptions about appropriate objectives for the education system, an operational way out of these difficulties in a fairly narrow educational sense is to derive measurements of quality from the approved curriculum of the schools. Assuming that the curriculum reflects what the schools are supposed to achieve, the procedure is in principle simple. All that is necessary is to test the pupils to discover how much of the curriculum they have mastered before the educational experience in question, and then retest them afterwards to discover how much of it they have mastered after the educational experience. However, in practice there are still very real problems. First, designing and administering the necessary pre- and post-tests are difficult and expensive. Second, there is the problem that pupil achievement on the post-test is not necessarily wholly attributable to the educational inputs provided by the schools, but may also be affected by characteristics of the pupils themselves, their families, and their other experiences in life. For example, separating out why pupils in schools in relatively wealthy urban areas seem to have mastered more of the curriculum than pupils in schools in poor rural areas (at first sight suggesting the first set of schools are of higher quality than the second) into how much is due to the school and how much to variations in the other experiences (study time, other family duties, family pres-

sure/encouragement/assistance, access to reading materials/TV/etc) the pupils undergo is a near-impossible task.

Nevertheless, some assessment of student achievement with respect to the approved curriculum, preferably related to pre-tests so that one can derive "educational value added," remains the most direct measure of quality that is generally possible. Unfortunately, in Indonesia at present this does not appear to exist, given that informed opinion appears unanimous that the EBTRANAS results cannot be used for this purpose.

Again, this means that until such direct assessments of student achievement become available, we will have to rely on indirect measures. The usual technique is to use measures of input per unit output, assuming that in some sense the educational process remains unchanged, so that if we increase inputs we must be getting better quality outputs (rather than just reduced efficiency). There are very real problems with this technique, the most important of which is the empirical finding from other countries that many input increases do not have positive impacts on student achievement. As already noted above, variations in pupil/teacher ratios in roughly the 20 to 45 range have not been shown to have perceptible impacts on student achievement. Empirical findings suggest that factors that do impact on student achievement include:

- expenditures on educational inputs other than personnel inputs, e.g., textbooks, teacher guides or manuals, chalk, paper, workbooks, furniture, laboratory equipment and supplies, etc.;
- efficient delivery of services to schools by the local administration;
- a high proportion of the school day devoted to instruction;
- regular in-service teacher training, teacher performance standards, and opportunities for professional enrichment for teachers;
- regular testing and feedback to students and parents on student progress;
- a curriculum that is appropriate to local culture and student needs and that is coherently implemented throughout the schools.

(See, e.g., *Indonesia: Basic Education Study*, World Bank Report No 7841- IND, December 22, 1989, footnotes on pp. 31, 34, 40, 41, 43, 45, text page 46.)

Unfortunately, measurement of these characteristics of schools and input types is difficult or impossible on a wide scale in Indonesia at

present, and not currently feasible to obtain in Pusat Informatika. I have listed therefore some other input measures which should be more easily obtainable, but stress that probably most of them do not, and will not, be closely connected to quality as usually understood. The two suggested indicators that are most likely to reflect input changes that are closely connected to quality are f. and g. below, the percent of public expenditure on education that is spent on materials and other non-personnel inputs, and the public production of text books (new titles and total numbers distributed per pupil).

(i) **Immediate:**

a. *Public expenditure/pupil-year, by level and state and total, in GDP/head units and real terms*

Rupiah data on total actual expenditure by level, although apparently not readily available, should be relatively easy to determine, and subsidies to private schools should be separable from expenditure on state schools. This indicator divides total actual expenditure by enrollment in the level (expenditure in state schools by enrollment in state schools, total expenditure including subsidies to private schools by total enrollment); but then converts from current rupiah to two alternative measures. The first should be an attempt at a real terms figure, deflating by the most suitable price index available (probably the combined Indeks Harga Konsumen di Ibukota Propinsi, although the government services component of the GDP deflator would probably be more appropriate). The second converts the measure into GDP/head units by dividing the current rupiah amount by the estimate of GDP/head in current rupiah for the same year.

Given that with rising GDP/head one anticipates a rising real income (at least eventually) for teachers, the GDP/head unit measure is likely to be a better measure of increases in real resource expenditure on education than the constant price rupiah number; it is also more appropriate for international comparisons, although index numbers of constant price expenditure per head can also be used (but will be distorted if in other countries real GDP/head and living standards of teachers are rising faster or slower than in Indonesia).

A "target" does not seem appropriate, although presumably it is desirable from a quality point of view (not an efficiency one) for the indicator to tend to rise over time and not fall.

b. Public expenditure/graduate, actual 1 year, by level and state and total, in GDP/head units and real terms

Same as a., except instead of dividing expenditure by enrollment, divide by number of graduates that year.

A crude measure of the public cost per graduate, i.e., resources provided per graduate, which may give some indication of quality. Same remarks apply with respect to conversion to real terms and GDP/head units, and the issue of a "target".

*c. Pupil/teacher ratios by level, total and state/private**

This is conventionally used as a measure of quality.

It should, however, be noted that empirical evidence suggests only very weak connections between pupil/teacher ratios and student achievement over quite wide ranges of possible values for pupil/teacher ratios, e.g., about 18 - 35 for secondary schools and 20 - 45 for primary schools. Many economists would place very low priority on reducing pupil/teacher ratios within ranges of that kind. Furthermore, this is only a very indirect measure of actual ratios of teachers to pupils in the classroom, because pupil and teacher loads (time in class) typically differ, and there is evidence of wide variations in teacher loads in Indonesia in particular. Hence d. may be a better indicator for quality purposes than c. Any "target" would be a policy decision.

*d. Pupil/class ratios by level, total and state/private**

Enrollment in the level and type of school divided by the number of classes in that level and type of school.

Because of variations in teacher loads, this may be a better indicator of quality (in the sense of how many pupils per teacher actually in the classroom) than c. above. However, the same caveat -- that connections with student achievement, on the basis of empirical work elsewhere, are only weak and tenuous at best, suggests that not too much reliance should be placed on this as an indicator of quality.

As in c., any "target" would be a policy decision.

*e. Class/classroom ratios, by level and state/private**

This is closely related to the percentage of school buildings of the type and level used for two or more shifts per day. It is the ratio of total classes in the level and type of school to the total of "owned classrooms" at that level and type. Institutionally, some schools operate double-shifts in

Indonesia, but a more common arrangement is for two or more schools to use the same buildings at different times of day; one school owns the buildings, the other(s) borrow or rent the classrooms. The questionnaires used by Pusat Informatika for the annual census of secondary schools ask schools about the number of owned and non-owned classrooms they use; this indicator is the ratio of classes to owned classrooms, the total number of owned classrooms being presumed to be close to the total number of physical classrooms in use (note that there may be some inaccuracy with respect to level and type in that schools with too few -- or no -- owned classrooms may be borrowing classrooms from schools of different levels or types). Note that this information is not asked for in the same manner from primary schools, which are asked about classrooms, but not explicitly about how many they own (they are asked to classify classrooms by condition and use); however, shared facilities are less common in primary schools, except in towns (where they are common).

The indicator thus reflects physical plant that is used for more than one shift per day. It is widely believed that this has a negative impact on quality, and therefore it makes sense to use it as an indicator.

The target could either be a policy decision or possibly zero. However, one should recognise that from a policy point of view, using physical plant for more hours per week is a significant step to cost reduction and therefore desirable from an efficiency point of view. In the absence of specific research from Indonesia suggesting serious deleterious impacts on student performance from school attendance at one of multiple shifts rather than a "standard daytime schedule," it saves substantial capital expenditure to use buildings for more than one shift and should not be discouraged. However, more research is needed because there is anecdotal evidence to suggest that it is not uncommon for public classrooms to be used for private schools which employ the same staff as the public schools, with dual enrollment by pupils not only permitted but encouraged, producing a moral hazard problem for the performance of the teachers in their state school jobs.

f. % public expenditure on materials/non-personnel inputs, by level

There is substantial empirical evidence from other parts of the world that there is a strong tendency to reduce the proportion of the public education budget actually spent (often as opposed to budgeted, which may not be reduced much) on teaching materials and other non-personnel inputs in times of financial stringency; and that there is reason to believe that the impact on student achievement of small increases in spending on

such teaching materials and other non-personnel inputs may be much greater than the impact of alternative uses of resources, such as reducing class sizes marginally. Accordingly, tracking this as a percentage may be a good indicator of quality. The biggest problem with it is that school-level enquiries suggest that as much as 25% or more of expenditure on non-personnel inputs is financed from BP3 contributions³ (see, e.g., M.C.A. Somerset, "Quality Issues in General Secondary Education," pp 34-39), on which no data are available centrally; but that there is very wide variation across schools in the level of BP3 contributions per pupil, even within the same level, type of school, and province.

The "target", if any, would be a policy decision, varying with level and type of school, and presumably adjusted for some expectation of BP3 contributions. In the long run, the alternative would be to include BP3 expenditure in public expenditure, and have the target decided on that basis. However, there may be practical difficulties in obtaining detailed BP3 data from all schools on a consistent basis (although it would be desirable to do so).

g. Public production of text books: new titles by level, and number of copies per pupil printed, by level, each year

Text books are one of the nonpersonnel inputs that have been shown in empirical work in other countries to be most important in improving student performance. One measure should be the number of new titles (not reprints, actual new texts, because many texts in Indonesia are said to be quite old and no longer suitable for the approved curriculum) by level. The other should be the actual number of textbooks printed (or distributed, whichever is easier to get) in a given year divided by enrollment that year in the level of education for which the books are intended. Whether enrollment should be total or state only depends on how pupils in private schools are supposed to be getting their books -- are they included in the distribution of publicly-provided books? There are two problems with this indicator in practice. The first is that there is substantial evidence that distribution of textbooks in Indonesia through public channels experiences substantial problems, so that the number of books printed or published may bear no consistent relationship to the number that get into the hands of students at a useful time. Second, there is increasing involvement of the private sector in text production and distribution, so

3 These are parent-teacher organization contributions; they are set at school level and vary from school to school.

that over time the public role in text production and distribution is likely to decline. A measure of total textbook distribution per student would be better than a public one, but data collection problems are likely to preclude that.

Any targets would be policy decisions.

(ii) Soon:

a. Public expenditure/graduate, "cycle", by level and state and total, in GNP/head units and real terms

The "cycle" version of (i) b. above, assuming that the transition matrices for this year's data remain fixed; then using this year's expenditure per pupil-year to estimate notional total expenditure (at this year's rates, from the total number of pupil-years, including repetition, that a notional cohort would consume moving through the system, as calculated from the spreadsheet analysis for this year's transition rates assumed fixed) to produce the eventual number of graduates that would appear; then dividing by that number of graduates to produce the public expenditure per graduate number. This can then be converted to real terms and GDP/head units as in (i) above.

This will differ from the "actual one-year" version because of the repetition issue, but will give a more accurate measure of expenditure of real resources per graduate for each type and level of school, at given current rates of expenditure, repetition, dropout and graduation. It is highly questionable to what extent it really would reflect quality directly, but tracking how it changed over time would be of considerable interest from a cost point of view in any case.

(iii) Eventually:

*a. % household expenditure on education, as available, and price index thereon**

The recent expenditure surveys used to construct the new consumer price index for the 27 Provincial capitals contains the % of household expenditure on education for each Provincial capital. These data are unlikely to be revised frequently, but nevertheless are of interest and should be reported. The price index, as noted above, is published regularly, and the price index on the education component of this index is an indirect indicator of educational quality, at least potentially. It should be tracked, and reported relative to the overall consumer price index (i.e., with the overall consumer price index as 100, what is the index for the

education component). If the price of education is rising relative to the overall index, this suggests a probable quality decline (because we expect less private purchases of education), and vice versa if the education index falls relative to the overall index this should suggest a quality improvement, because we would expect private purchases of education to increase. However, in the absence of any direct estimates of the price elasticity of demand for education in Indonesia, the result can only be suggestive. One might reasonably expect that overall household demand for education will tend to be quite inelastic, although the cross-elasticity between state and private schooling might be quite large. It might be worth exploring with BPS what data they actually collect to construct the "pendidikan" (education) subcomponent of the index, in that it is possible there would be enough data to construct a price index for private education as well as the overall one, and this would be very useful to have.

b. Direct measures of student achievement, by level, state, private and total

The most useful indicator of quality will be something that reflects student achievement directly. There would appear to be two possibilities. The first would be some indicator based on EBTRANAS performance. However, it has been suggested to me that the style, structure, and administration of these examinations do not lend themselves to inferences about student achievement. If this is so, then the alternative would be to mount a separate exercise to test student achievement directly (presumably in a small sample of schools) by special instruments, possibly administered in conjunction with the EBTRANAS. This is obviously an expensive and large-scale undertaking, but if it is true that the current national examination system does not provide reliable information on student achievement, then it should be considered. It is a serious problem to have no direct information on what students are actually achieving in schools. It appears that a pilot program for national achievement measures is being mounted in some provinces.

I.3. Equity:

(i) Immediate:

*a. Relative male/female enrolment ratios, by level, state, private, and total**

Enrollment ratios for females as a percentage of the enrollment ratio for males, for each level and type of school. As discussed above under

I.1.(iii)f., Total Enrollment Ratios in addition to gross and net would be likely to be particularly revealing on the male/female issue at secondary age levels, but data availability makes it unlikely they could be produced immediately.

The target should presumably be 100, and variations from 100 show relative over- or under-enrollment of females compared to males.

*b. Relative repetition rates by male/female, by level, state, private, and total**

Repetition rates for females as a percentage of repetition rates for males, for each level and type of school, and if possible also for entry-year only into each level and type of school.

Again, the target should presumably be 100, and variations from 100 show differential repetition by females. In addition to provincial variation, it would be very interesting to be able to distinguish between urban/rural/remote or a finer classification of regional characteristics.

*c. Relative graduation rates by male/female, for each level and type of school**

Graduation rates for females as a percentage of graduation rates for males, for each level and type of school. If possible, one could do both actual one-year and the "cycle" completion rates, but the latter may not be worth the effort (and should definitely be in the "soon" category, not immediate).

Wholly analogous to a. and b. above, the target should presumably be 100.

*d. Provincial maximum and minimum compared to Indonesia mean, all those marked**

As discussed at the beginning of this document under *Equity Issues*, for all those indicators marked * it should be relatively simple to calculate values by province as well as for Indonesia as a whole. In this section on provincial variation, the maximum and minimum by province should be reported compared to the Indonesian mean, for each of these indicators, both in raw form and then rescaled to the Indonesian mean equal to 100 in each case to allow comparison across indicators of the extent of interprovincial variation. Where one province is a clear outlier (as is the case on some of these indicators), it would be useful to identify the outlier value, and give it, and then give the maximum, minimum, and range compared to the mean omitting the outlier. A working definition of

"outlier" could be a value more than 10% different from the next highest/lowest value.

(iii) Eventually:

- a. Relative values of (ii) a., b., and c. (enrollment, repetition, and graduation rates) by socio-economic characteristics of school location (or kecamatan or kabupaten)*

Instead of doing male/female relative ratios, do urban/rural (or metropolitan/urban/periurban/rural/remote), when data are available by classification of schools or administrative districts. It is likely in Indonesia that there is more inequality on this basis than on either male/female or a provincial basis. In the meantime, report what data are available from BPS sources.

- b. Include total enrollment ratios ((I.1.(iii)f. above) in male/female provincial max/min, and socio-economic characteristics comparisons*

[See discussion under I.3.(i) a. above.]

II. LONGITUDINAL

For most of the indicators suggested above under I., a single year's information is not of much use in itself; it is far more meaningful to track change over time, to see directions of change and get warning of changes. Thus the heading here is not intended to suggest that the indicators above should not be maintained, and that presentations of them should focus on a single year's data rather than trends over time; quite the reverse. Graphs showing change over time are likely to be much more informative than the numbers for a single year. However, in many cases the data are not available to estimate all these indicators retrospectively to produce long time series, and in addition for many of them there is little chance of being able to obtain retrospective data for comparable indicators for international comparisons. Hence, the focus of this section labelled "longitudinal" is to suggest indicators that are likely to be relatively easily assembled retrospectively for purposes of illuminating the longterm evolution of the education system in Indonesia, and its performance relative to other countries that are Indonesia's neighbors and economic competitors.

In other words, the following indicators are suggested for preparation of a retrospective review of the development of the education system in Indonesia over the 25 years of the first five Repelita, and for comparison

with neighboring and competitor countries in Asia. The division this time is only one-way, into the four groups Descriptive, Efficiency, Quality, and Equity, except for a few instances of suggestions for "maybe later". The meaning of the mark * is the same as before. Brief comments are made on comparisons with other countries where appropriate; it should be assumed that the comparisons are made only on the total (or for public expenditure, state) indicators, because detailed breakdowns into state and private are unlikely to be available for most countries (and private schools may be quantitatively more important in Indonesia than in most of the comparator countries).

Many of the indicators are either self-evident or identical to ones discussed in I above, and in these cases discussion will be minimal or omitted.

II. A. Descriptive

a. #'s pupils, teachers, schools, classes, classrooms, graduates, by level and state/private/total; actual #'s and index numbers

Index numbers are essential for comparisons with other countries; they also make the quantitative dimension of the expansion easier to grasp. For international comparisons, the key point is that all the series should be calculated on the basis of the same base year as 100; this should presumably be the earliest year for which data are available for all the countries which it is desired to include in the comparison.

b. Enrollment ratios, gross and net, levels and new entry each level, by total/state/private

New entry each level may not be available for the whole time period, but would be useful if it is feasible to estimate it. The key issue is the existence of population estimates by age for each year. There are standard and acceptably accurate techniques for estimating single-year age distributions from populations reported in five-year age groups, and for interpolating population estimates between census years. For countries as a whole, such as Indonesia, these methods would probably be adequate to reveal trends relatively accurately. Because of problems with interprovincial migration, it might not be reasonable to use such methods to produce estimates of enrollment ratios in non-census years at provincial level, but experimentation would suggest whether trends being revealed looked reasonable or not.

c. Public expenditure on education, as % total public expenditure and % GDP/GNP

If not available easily elsewhere for earlier years, these should be obtainable from the World Bank's annual *World Development Report*, the UN System of *National Accounts Yearbook*, and the IMF's *Government Financial Statistics*. They have been collected on this trip for the period 1981-86 for an appropriate group of countries. A comparability problem may arise between countries where the division between central, provincial, and local fiscal responsibilities differ, and there is not complete reporting to the relevant international agencies. The IMF source is probably the best on expenditure, but has to be used with other sources to convert to % GDP/GNP as a rule.

d. % distribution of public expenditure on education across levels

Probably necessary to use a crude primary/secondary/higher breakdown, especially for international comparisons. Data availability for international comparisons likely to be spotty without a major effort. Nor are these data easily available for Indonesia. However, with work they could obviously be obtained for Indonesia, and it would be very desirable to go to the effort to develop a longitudinal time series of what this breakdown has been in Indonesia over the period of the first 25 year plan. For Indonesia, it would also be desirable to try to distinguish between recurrent, capital, and total expenditures, which again will require a substantial analytic effort (and may not be feasible), because the Indonesian categories "rutin" and development do NOT correspond to the analytic categories recurrent and capital.

e. % secondary students in vocational/technical schools

Older data should be available internationally from UNESCO *Statistical Yearbook*; recent data for other countries may be hard to get.

f. Public expenditure per pupil-year, by level, total and state, as index with SD = 100

Probably only a few isolated years available internationally. Easily calculated for Indonesia provided b., c., and d. are available. The objective behind presenting this as an index with primary school expenditure per pupil-year set at 100 each year is to show trends over time (and across countries, to the extent foreign data can be obtained) in the relative expenditure per pupil at the different levels of education.

g. % composition of economically active population by educational attainment OR average years of schooling of same

Will only be available for a few years, but useful indication of overall education of the labor force, and lack of an annual series not a big problem because only changes slowly. Sources likely to be the census and labor force surveys; important to check comparability of definitions and data interpretation methods used -- data in *Statistik dan Perkembangan Pendidikan* 1987/88 for Indonesia look very fishy/non-comparable (the average years of education completed by the labor force in Indonesia is shown as having increased by a full year between 1978 and 1980, which seems most unlikely). In Indonesia, it is well established that data on labor force status and economic activity status of the population derived from the labor force survey (Sakernas) is not comparable to the same types of data derived from the census (because of definition problems and quality/control issues with enumerators).

II. B. Analytic

II. B.1. Efficiency

a. Graduation rates, on time and final, by level, total and state/private

The on time graduation rate can be approximated quite quickly by, for each level of education normal length N years, dividing number of graduates in year X by enrollment in Tingkat [grade] 1 of the level of education in year $(X - N + 1)$ less the number of repeaters in grade 1 that year (if known; this adjustment is likely to be important for primary school, not so important for the other levels). In this way, a time series can be easily constructed that covers most if not all of the 25 years for Indonesia [The formula depends on how graduates are reported. The formula given is based on the assumption that graduates at the end of, say, the 1989/90 academic year are reported in the 1989/90 data. If, as I believe is what happens in Pusat Informatika data, they are reported in the 1990/91 data, the formula should be "divided by enrollment in Tingkat 1 of the level of education in year $(X - N)$, less the number of repeaters in Tingkat 1 that year"]. Comparative data may be much harder to obtain, unless educational statistics yearbooks can be obtained from each country, although it may be possible to calculate the figure from data in UNESCO *Statistical Yearbooks* for earlier years. Final graduation rates are derived from the transition matrices taking account of repetition in all grades of the level and late graduation of repeaters, as described in I above, and are

intensive of staff time to calculate. This may not be feasible for earlier years if transition matrices do not exist. Transition matrices are unlikely to be easily obtainable for other countries. Such data are not likely to be easily available immediately at a provincial level in Indonesia, but Kanwils should be encouraged to produce and use their province-specific transition rates for these kinds of calculation.

*b. Repetition rates by level and for Tingkat [grade] 1 of each level, total and state/private**

Repetition rate for the first year, if available, is useful because much of the repetition (especially in SD, primary school) is often concentrated there. However, this may not be available for international comparison purposes.

c. Public expenditure per pupil-year, real terms and GDP/head units, by level, state and total

Assuming total public expenditure can be obtained by level (if only on the crude primary/secondary/tertiary basis), this divided by enrollment in those levels gives a current rupiah figure of public expenditure per pupil-year. For purposes of comparison over time, this needs to be converted into real terms by deflation by a suitable price index (probably urban consumer price index, although the government services component of the GDP deflator would be better). For purposes of comparison across countries, and also of interest for comparisons over time within countries (see discussion under I above), conversion to GDP/head units is required. Only likely to be available for isolated years for comparator countries, but should be calculable for Indonesia for most of the period.

d. Public expenditures per graduate, actual one-year and "cycle", real terms and GDP/head units, by level, state and total

This is in part (the "cycle" part) an "eventually" item, if feasible at all. The one-year version should be calculable fairly straightforwardly, however, if numbers of graduates and c. immediately above are available/feasible. It would give a notion of how the public expenditure cost of producing graduates (in crude terms) has changed in real terms and GDP/head units over the period. Not very likely to be available for comparator countries except for isolated years.

II. B.2. Quality

a. *Pupil/teacher ratios, by level, state, private, and total**

No substantive additional comments required. As discussed above, in Indonesia presentation should take great care to emphasise that few if any *quality* inferences can be legitimately drawn from changes in this number without substantial additional information.

b. *Pupil/class ratios, by level, state, private, and total**

No additional comments required; see discussion above.

c. *Class/classroom ratios, by level, state, private, and total**

No additional comments required. Not very likely to be easily available for other countries in a strictly comparable form.

d. *% public expenditure on non-personnel teaching materials inputs, by level if possible*

Although this is somewhat misleading because in many schools in Indonesia BP3 income is used to purchase a large fraction of non-personnel inputs used, if it can be extracted from the available public expenditure data it would be useful to see trends in it; and it may be available for some other countries (the World Bank often tries to produce it). Within Indonesia, a similar percentage including BP3 income would be better if full reporting of BP3 contributions and their uses can ever be organized.

e. *Public production of text books: new titles by level, and number of copies per pupil printed, by level, each year*

This should be obtainable at least for the last few years during which text production has been centralised, for Indonesia as a whole, and would be of some historical interest.

II. B.3. Equity

(i) Immediate

a. *Male/female relative enrollment, repetition, and completion/graduation rates, by level, total, state and local**

See discussion under I above. It would be nice to be able to report urban/rural as well, but this would appear to be impossible from Balitbang Dikbud data, until the reporting units in the data collection system are classified by location characteristics. It might be possible to report something close to it from SUSENAS or SAKERNAS surveys for isolated

years. At least some relative male/female enrollment ratios should be available for some other countries.

- b. Maxima and minima by province compared to Indonesia mean, all marked * (reported as range of actual numbers and as range of index with mean = 100)*

See discussion under I above. The intent should probably be to show evolution of the provincial range over time for Indonesia (e.g. by line graph time series, for at least some of the indicators -- doing all for all levels and types of school would probably produce more information than can readily be absorbed). There is no sensible way to make international comparisons on this measure, because sub-national organization differs markedly between countries, and in any case sub-national data are unlikely to be available.

(ii) Maybe later

- a. Include total enrollment ratios ((I.1.(iii)f. above) in male/female, provincial max/min, and socio-economic characteristics comparisons*

SUMMARY LISTING OF SUGGESTED INDICATORS:

The first time an indicator is mentioned, a formula is given if the derivation is not completely obvious. This is not repeated each time the same indicator, or one completely analogous, is mentioned.

I. ANALYTIC

I.1. Efficiency

(i) Immediate:

- a. Repetition rate, by level, total and state/private**

(# Repeaters)/(# pupils enrolled)

- b. Completion rate, by level, total and state/private, actual one year on-time**

(# graduates year X)/[# pupils enrolled Tingkat 1 year (X - N) less # repeaters in Tingkat 1 year (X - N)], or (# graduates year X)/[# new entrants to grade 1 of level in year (X - N)], where N is normal length of the level of schooling in years, assuming graduates at the end of year (X - 1) are reported as graduates year X. (In Indonesia, data on new entrants to each level are collected directly, so those numbers are probably preferable to subtracting out repeaters). Migration and transfers between types

of secondary school will affect accuracy, but only inspection of actual numbers will suggest how serious this is (biggest potential problem is at secondary levels where transfers to private schools after starting in state schools may make private rates appear better, and state schools worse, than reality; but if this process occurs, inspection of actual by-grade enrollment data over time will reveal that it is happening).

*c. Pupil-years/graduate, actual 1 year, by level, total and state/private**

(Total # pupils enrolled in level in year X)/(# graduates from level year X)

d. Graduates/class-year, actual 1 year, by level, total and state/private

(# graduates in year X)/(total # classes, all tingkats, at that level in year X)

*e. Graduates/teacher-years, actual 1 year, by level, total and state/private**

(# graduates in year X)/(# teachers at that level, all tingkats, year X)

*f. Available public and private expenditure and cost data**

(ii) **Soon:**

To calculate cycle indicators, it is necessary to have the transition matrix of that year's data for each level, i.e., for each tingkat, the proportion of pupils who after last year (a) were promoted to next tingkat/graduate (i.e., are enrolled this year in the next higher grade than last year, or graduated from the level at the end of last year), (b) repeated (defined as re-enrolled in the same grade as last year, whether the pupil finished that grade last year or not), or (c) dropped out (i.e., were in school last year but not this year). One can then set up a spreadsheet and start with a notional cohort of 1000 and follow them through the system, tracking the repeaters so long as they are more than 0.5, and finding the eventual fate of each of the 1000 (they either complete or dropout). Adding total years of enrollment for the cohort over their total careers in the level, one can get total pupil-years for the calculated number of eventual graduates, and dividing one into the other gives pupil-years per graduate; dividing pupil-years in each tingkat by average pupil/teacher ratios for each tingkat and by average pupil/class ratios for each tingkat allows calculation of total teacher-years and class-years for the cohort, and thus dividing them into calculated number of eventual graduates gives

graduates per teacher-year and per class-year. With unit costs (or unit public expenditures) available, this also allows calculation of costs (or public expenditures) per graduate at current rates, by multiplying the number of pupil-years per graduate by the cost (or public expenditure) per pupil-year (commonly known as cycle costs or cycle expenditures).

- a. *Completion rate, by level, total and state/private, implied cycle final**
- b. *Pupil-years/graduate, "cycle", by level, total and state/private**
- c. *Graduates/class-year, "cycle", by level, total and state/private**
- d. *Graduates/teacher-years, "cycle", by level, total and state/private*

(iii) Eventually:

- a. *Unit costs and cycle costs, real terms and GNP/head units, by level, total and state/private*

See above under (ii). Convert to real terms by choosing a base year, say Y, and then produce index for year X with year Y = 100 by

$$[(\text{Rp. year X})(\text{CPI year Y})/(\text{Rp. year Y})(\text{CPI year X})](100)$$

Convert to GNP/head units by

$$(\text{Rp. year X})/(\text{GNP/head estimate year X in current Rp.})$$

- b. *Rate of return estimates by level and type of school*
- c. *Relative earnings or wages/salaries or expenditure by education level*

Report as index number with "tidak/belum SD" = 100; i.e., divide actual average reported by BPS for each level by average reported for "tidak/belum SD" and multiply by 100. If BPS data continue to be for wage and salary employees only, report as "relative wages/salaries of formal sector employees." Do NOT include census-derived data with labor force survey-derived data without careful checks for comparability.

- d. *Proportion of the economically active population with given educational qualifications looking for work, never having worked*

Percentages; possibly also as index against "tidak/belum SD" = 100. Do NOT include census-derived data with labor force survey-derived data without careful checks for comparability.

e. Labor force status of the economically active by educational attainment

Percentages, layout depends on availability of data from BPS sources. Do NOT include census-derived data with labor force survey-derived data without careful checks for comparability.

f. Total enrollment rates, by level and public/private

(Enrollment in schools of all levels by pupils of appropriate age for schools of level X)/(total population of appropriate age for level X)

Can be derived from BPS survey and census data for specific years, but comparability problems likely. Cannot be derived from Pusat Informatika data until age by grade data for secondary schools collected.

I.2. Quality

(i) Immediate:

- a. Public expenditure/pupil-year, by level and state and total, in GDP/head units and real terms*
- b. Public expenditure/graduate, actual 1 year, by level and state and total, in GDP/head units and real terms*
- c. Pupill/teacher ratios by level, total and state/private**
- d. Pupill/class ratios by level, total and state/private**
- e. Class/classroom ratios, by level and state/private*
(# classes)/(# owned classrooms)*
- f. % public expenditure on materials/non-personnel inputs, by level*
- g. Public production of text books: new titles by level, and number of copies per pupil printed, by level, each year*

(ii) Soon:

- a. Public expenditure/graduate, "cycle", by level and state and total, in GNP/head units and real terms*

(iii) Eventually:

- a. % household expenditure on education, as available, and price index thereon**
- b. Direct measures of student achievement, by level, state, private and total*

I.3. Equity:

(i) Immediate:

- a. *Relative male/female enrolment ratios, by level, state, private, and local**

$[(\text{Enrollment ratio, female})/(\text{enrollment ratio, male})](100)$ -- can be done for whatever enrollment ratios available, i.e., net, gross, or total.

- b. *Relative repetition rates by male/female, by level, state, private, and local, if possible**

$[(\text{Repetition rate, female})/(\text{repetition rate, male})](100)$

- c. *Relative graduation rates by male/female, for each level and type of school**

$[(\text{Graduation rate, female})/(\text{graduation rate, male})](100)$

(Graduation rate can be one-year or cycle or both)

- d. *Provincial maximum and minimum compared to Indonesia mean, all those marked **

(iii) Eventually:

- a. *Relative values of (ii) a., b., and c. (enrollment, repetition, and graduation rates) by socio-economic characteristics of school location (or kecamatan or kabupaten)*

- b. *Inciude total enrollment ratios ((I.I.(iii)f. above) in male/female, provincial max/min, and socio-economic characteristics comparisons*

II. "LONGITUDINAL"

II.A. Descriptive

- a. *#'s pupils, teachers, schools, classes, classrooms, graduates, by level and state/private/total; actual #'s and index numbers*

Choose a base year X; index number in year Y is then

$[(\text{actual \# year Y})/(\text{actual number year X})](100)$

- b. *Enrollment ratios, gross and net, levels and new entry each level, by total/state/private*

Gross enrollment ratio is $[(\text{total \# enrolled})/(\text{total population of appropriate age range})](100)$, as a percent.

Net enrollment ratio is $[(\# \text{ enrolled of correct age})/(\text{total population of appropriate age range})](100)$, as a percent.

"new entry" is $[(\# \text{ enrolled in tingkat 1 of level})/(\text{population of correct age to enroll in tingkat 1})](100)$, for gross, and $[(\# \text{ of correct age enrolled in tingkat 1 of level})/(\text{population of correct age to enroll in tingkat 1})](100)$, for net, both as percents. The single-year age population can be interpolated from the five-year age group population estimates made by KLH and published by BPS; if there is doubt as to how to do it, any demographer could advise.

If possible, desirable to do for male and female, and urban and rural, separately; and by province, for provincial variation. The estimates of five-year age distribution by province are published.

- c. *Public expenditure on education, as % total public expenditure and % GDP/IGNP*
- d. *% distribution of public expenditure on education across levels*
- e. *% secondary students in vocational/technical schools*
- f. *Public expenditure per pupil-year, by level, total and state, as index with SD = 100*
- g. *% composition of economically active population by educational attainment OR average years of schooling of same*

Do NOT include census-derived data with labor force survey-derived data without careful checks for comparability.

II. B. Analytic

II. B.1. Efficiency

(i) Immediate:

- a. *Graduation rates, on time, by level, total and state/private**
- b. *Repetition rates by level and for Tingkat 1 of each level, total and state/private**
- c. *Public expenditure per pupil-year, real terms and GDP/head units, by level, state and total*
- d. *Public expenditures per graduate, actual one-year, real terms and GDP/head units, by level, state and total*

(ii) Possibly later:

- a. *Graduation rates, final, by level, total and state/private*
- b. *Public expenditures per graduate, "cycle", real terms and GDP/head units, by level, state and total*
- c. *Total enrollment rates, by level and public/private**

II. B. 2. Quality

- a. *Pupil/teacher ratios, by level, state, private, and total*
- b. *Pupil/class ratios, by level, state, private, and total**
- c. *Class/classroom ratios, by level, state, private, and total**
- d. *Public production of text books: new titles by level, and number of copies per pupil printed, by level, each year*

II. B. 3. Equity**(i) Immediate**

- a. *Male/female relative enrollment, repetition, and completion/graduation rates, by level, total, state and local**
- b. *Maxima and minima by province compared to Indonesia mean, all marked * [reported as range of actual numbers and as range of index with mean = 100]*

(ii) Maybe later

- a. *Include total enrollment ratios ((I.1.(iii)f. above) in male/female, provincial max/min, and socio-economic characteristics comparisons*

