Education System Quality Indicators

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I. Introduction

Education systems in the world are vast organizations that are very complex to manage. They emerge over time and their formation and maintenance reflect differing historical traditions, cultural values and religious interests as well as divergent views about the role of the state in shaping the life-chances of its future citizens (Hoffman, Hoffman, Gray, & Daly, 2004.). The quest for higher performance through educational reform has been a worldwide phenomenon, especially over the last decade, and accordingly, the world witnessed a trend towards restructuring education systems. Most countries experienced a change in relationships between different levels of the system, or changes in the role of the state, or changed methods and models of managing the education system (Wallin, 1995). The following section will outline the major factors that have dominated the education reform movement in the last two decades.

II. Education Reform in Last Two Decades

In recent years, political and educational discussions have increasingly raised questions about the quality of education. This interest had its origins in a) emergence of a widely held belief that education systems and their relative cross-national performance were a key element in strategies designed to achieve improvement in national economic development in an increasingly globalized and competitive world, and b) public concerns that governmental expenditures were enormous and they needed to be accompanied by higher levels of scrutiny and accountability concerning the quality of education, especially as education budgets are under pressure (Ross & Genevois, 2006).

Reforms that have dominated the education scene in the 1980s, 1990s, and into the 2000s and major forums organized by international agencies also turned their attention towards issues related to the quality of education and the need for assessment. The 1990 Jomtien World Conference on Education and 2000 Dakar World Education Forum both called for a broader view of education beyond a concentration on increased access. These declarations emphasized that in addition to increased participation in education, all nations need to 'improve all aspects of the quality of education and ensure excellence so that recognized and measurable leaning outcomes are achieved by all'. Assessment information may be used to reach a judgment about the adequacy of the performance of an education system or of a part of it.

Accordingly, there has been increased government interest in monitoring and evaluating the quality of education. Governments needed objective data to provide evidence through which student learning achievement may be monitored both nationally and internationally. They needed to monitor student performance over time and in a cross national comparative perspective, in order to provide information for assessing how well or how badly education systems are preparing young people for future adult roles as creative, thinking citizens who can sustain themselves and

contribute to well being of their societies (Pigazzi, 2006). The availability of objective data, not only for the monitoring and planning of the education system, but also for use in public debates, was seen as a necessity by policy-makers. A culture of evaluation was being formed (European Training Foundation, 2003).

Towards the end of the 1990s and into the new millennium, the increased levels of national and international dialogue about the importance of the 'quality of education' resulted in decisions by many countries to implement programs for national assessment of educational progress, and to participate in networks that conducted large-scale cross-national educational research studies (Pelgrum, Voogt, & Plomp, 1995). Educators believed that research on the quality of education required an international focus because variations among countries in terms of educational policies, practices, and traditions provided a natural laboratory for the study of those aspects of educational environment that were likely to have a substantial and consistent impact upon improved student learning. They also argued that cross-national studies of the quality of education offered much more than national studies because 'custom and law define what is educationally allowable within a nation, whereas the educational systems beyond one's national borders suggest what is educationally possible. (Foshay et al, 1962, as cited in Ross & Genevois, 2006). The increasing awareness of the usefulness of these monitoring systems has resulted in a need for indicators that can help in tracing shortcomings and improving educational outcomes. The need for information on quality of education has led to many different research initiatives; such as, national assessment studies, international comparative studies, national indicator development projects, etc. (Pelgrum, et. al, 1995).

International comparisons of education, despite their problems and costs, have one particular advantage. They have become important instruments for education policy makers in responding to an increasing demand for greater accountability in the public sector of education. Many countries, for example, have set national and local standards for assessing outcomes. Though many of these standards are not internationally comparable, yet they establish important benchmarks. Above all, they foster a culture of self-evaluation around outcomes (Bengston, 2004).

The following sections will attempt to provide a conceptual framework for quality education, and will present different models emanating from this conceptual framework. Then, will attempt to provide an explanation of indicators, their uses and types, and finally will describe some of indicator sets currently in use for measuring education quality at system level.

III. Education Quality

1. Definition.

The debate and the views of what constitute education quality are as old as education itself and they are constantly evolving. It is a debate influenced by values, norms and subjective judgments (Bengston, 2004). It is not meaningful to try to arrive at a tight, single definition of educational quality, given the evolving scope of education, and the great variety of education systems and value-structures. There is

no single approach and no size fits all, as different contexts, circumstances, systems, and resources mean that there are different entry points (Ross & Genevois, 2006).

Simplest way to define education quality is to refer to available international indicator systems and to conclude that education quality is what these indicator systems describe and measure (Scheerens, 2004). A more functional definition views quality as the adequacy or appropriateness of objects or processes for the purposes for which they were intended (Kellaghan & Greaney, 2001). Conventional definitions have focused on inputs and have included literacy, numeracy and life skills, and those have been linked directly to such critical factors as teachers, content, methodologies, curriculum, examination systems, policy, management, and administration.

The expanded vision of what is education as articulated by the Jomtien Conference, the exponential growth of new knowledge, and the emerging educational needs of the new millennium have rendered the traditional meaning of 'quality of education' obsolete, and a need arose to re-think the concept more comprehensively. Most of education systems are national initiatives and entities that were not built for a rapidly developing global knowledge economy, where the production, mediation and use of knowledge increasingly operate in a borderless world (Bengston, 2004). Moreover, global economic competition has brought to the fore the critical importance of quality of human resources, and the demand for new competencies in today's information society. The educational system, schools, and individual students were all under increasing pressure to perform (Kellaghan & Greaney, 2001).

Accordingly, and with the advent of knowledge society, educational systems needed to focus on what is learned and how it is learned, and they need be transformed into systems of life long learning with new definitions of education and learning quality. They need to develop concepts, practices and quality standards for a range of different types of knowledge from know-what to know-how, from explicit to tacit knowledge; a broader range of competencies and skills for the 21st century (Bengston, 2004).

Given the diversity of understanding and interpretation of quality evident in the different traditions discussed above, defining quality and developing approaches to monitoring and improving it requires the following:

- broad agreement about the aims and objectives of education and this embodies moral, political, and epistemological issues;
- a framework for the analysis of quality that enables its various dimensions to be specified;
- an approach to measurement that enables the important variables to be identified and assessed;
- a framework for improvement that comprehensively covers the interrelated components of the education system and allows opportunities for change and reform to be identified.
  (UNESCO, 2005)

The following section will outline conceptual model for quality of education and then will describe various understandings of this model by international organizations.

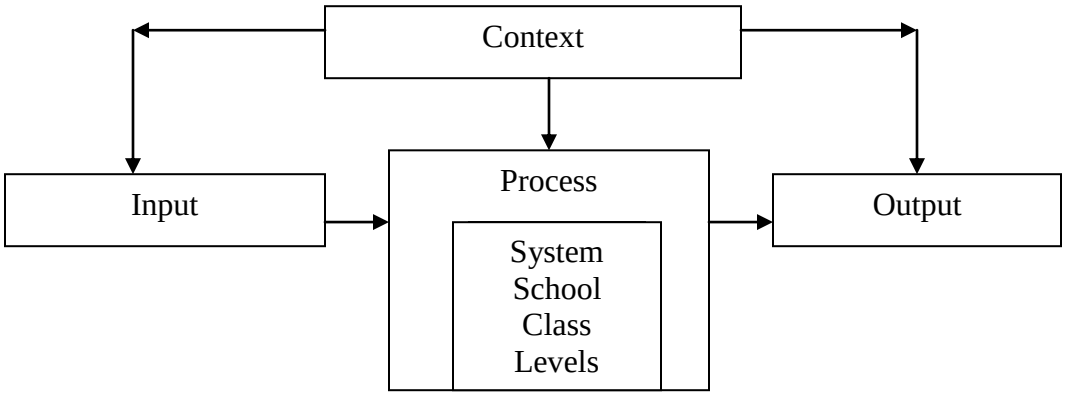
2. *Conceptual Framework.*

A. Basic Framework. Perspectives on education quality can be clarified on basis of a conceptual framework that describes education. Most frequently used one is the one that depicts education as a productive system, in which inputs are transferred into outcomes (Kellaghan & Greaney, 2001; Scheerens, 2004; UNESCO,

2005). This basic model, Figure 1, can be elaborated using following steps:

a. Context dimension that provides inputs, constraints, and is a generator of required outputs to be produced.
b. Outcomes as direct outputs, longer term outcomes and ultimate societal impact;
c. Conditions and processes with a hierarchical nature (system, schools, and classroom levels).

Figure 1. Basic Systems Model of Functioning of Education



Within this basic framework, at least six ways in defining quality can be identified by emphasizing certain parts, aspects or relationships from basic framework (Scheerens, 2004).

a. Productivity view. Success of system is depending on attainment of aspired outcomes/outputs; accordingly output/outcome/impact indicators are predominant or only type of quality indicator that needs to be monitored.
b. Instrumental effectiveness view. Emphasizes context, input and process indicators as their effectiveness is essential for successful outputs, therefore instrumental potential are of vital importance.
c. Adaptation perspective. How to do the right things leading to a critical analysis of educational goals.
d. Equity perspective. When inputs, processes and outcomes are analyzed in their equal or ‘fair’ distribution among participants in education with different characteristics.

e. Efficiency perspective. Considers highest possible outcomes at lowest possible costs.
f. The disjointed view. Each element of the model is considered 'on its own' and judges whether it is manifested in an acceptable way or at an acceptable level. For ex. level of teacher training, class size, etc.

Based on this basic education model, several indicator sets at system level were developed like ones used in OECD INES project and the 'Sixteen Quality Indicators' of the European Commission. A slightly different conceptualization of quality education was presented by international organizations like UNESCO and UNICEF that will be described in next section.

B. UNESCO Framework. In its report *Learning: The Treasure Within, Report to UNESCO of the International Commission on Education for the Twenty-first Century*, the commission saw education throughout life as based upon four pillars:

- *Learning to know* acknowledges that learners build their own knowledge daily, combining indigenous and 'external' elements.
- *Learning to do* focuses on the practical application of what is learned.
- *Learning to live together* addresses the critical skills for a life free from discrimination, where all have equal opportunity to develop themselves, their families and their communities.
- *Learning to be* emphasizes the skills needed for individuals to develop their full potential.

This conceptualization of education provided an integrated and comprehensive view of learning and, therefore, of what constitutes education quality (Delors et al., 1996). In addition, UNESCO promotes access to good-quality education as a human right and supports a rights-based approach to all educational activities (Pigozzi, 2004). Within this approach, learning is perceived to be affected at two levels. At the level of the *learner,* education needs to seek out and acknowledge learners' prior knowledge, to recognize formal and informal modes, to practice non-discrimination and to provide a safe and supportive learning environment. At the level of the *learning system,* a support structure is needed to implement policies, enact legislation, distribute resources and measure learning outcomes, so as to have the best possible impact on learning for all (UNESCO, 2005).

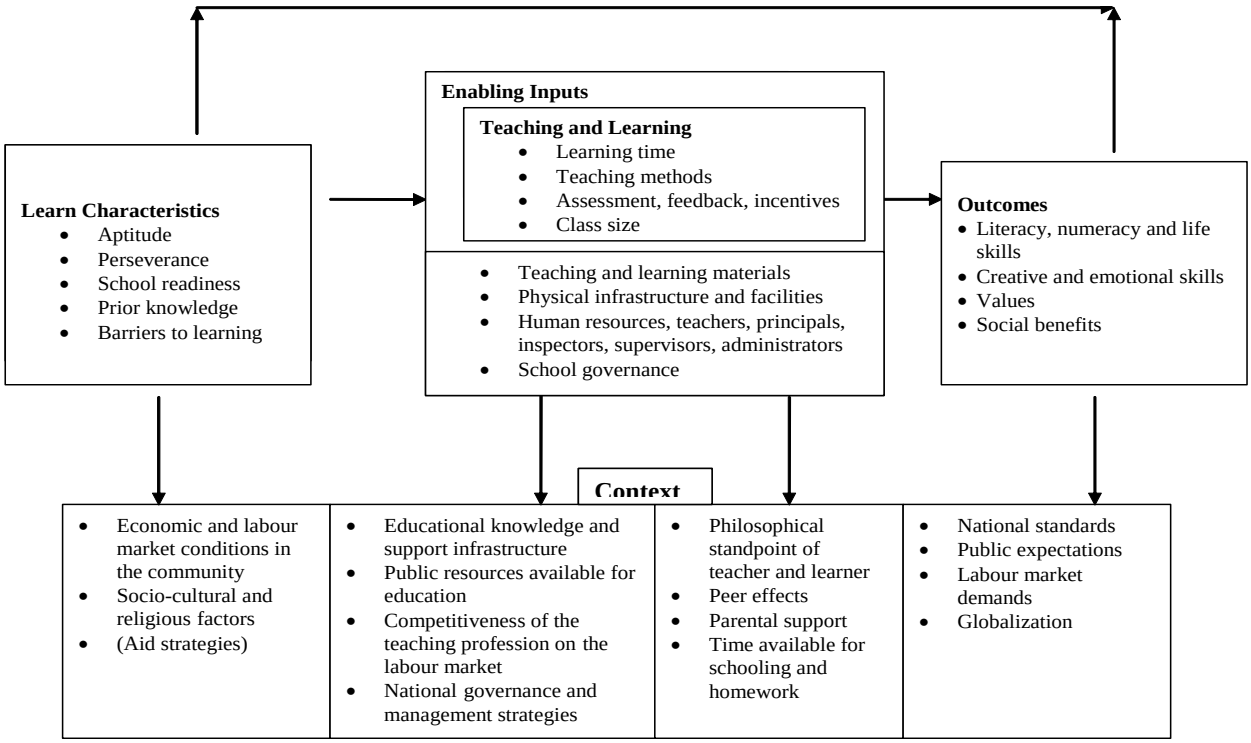
To meet the above vision of education, the main elements of the education systems and the central dimensions influencing core processes of teaching and learning were characterized as follows:

- learner characteristics dimension;
- contextual dimension;
- enabling inputs dimension;
- teaching and learning dimension;
- outcomes dimension.

The framework is comprehensive, in that the quality of education is seen as encompassing access, teaching and learning processes and outcomes in ways that are influenced both by context and by the range and quality of inputs available. It emphasizes education's relevance to the world, and addresses social and other dimensions of learning. According to this perspective, quality of education must recognize the past, be relevant to the present, and have a view to the future. It should reflect the dynamic nature of culture and languages, and the value of the individual in relation to the larger context (Pigozzi, 2006). The role of the education system is to create and support learning experience. Figure 2 lists the various elements of the model.

UNICEF's view of quality is quite similar and it strongly emphasizes what might be called desirable dimensions of quality, as identified in the Dakar Framework. Its paper *Defining Quality in Education* recognizes five dimensions of quality: learners, environments, content, processes and outcomes, founded on 'the rights of the whole child, and all children, to survival, protection, development and participation' (UNICEF, 2000).

Figure 2. UNESCO Framework for Understanding Education Quality



Having identified the aims and objectives of education and specified the dimensions of its quality, attention should be focused on identifying variables that need to be assessed and measured in order to monitor efficiency of the education system. The following sections will describe indicator tools used for this purpose and will present an outline of various indicator sets in use at system level.

IV. Indicators and Indicator Sets at System Level

1. Indicators.

Education indicators are statistics that are useful for planning, management and policy making (OECD, 1991). They may be defined as tools that offer a good description of the education system and provide a sense of its state, in addition to providing the grounds for an analysis of education policy at the national level. A system of indicators must function like a control panel, facilitating the identification of problems and measuring their magnitude. Accordingly, the role of indicators could be defined as:

- describing the present situation,
- quantifying the objectives which have been set,
- providing continuous updates on progress towards certain objectives or,
- providing insights into which factors might have contributed to achieving the results (European Commission, 2002).

For an indicator system to function properly and fulfill its role, it requires a good information system and an education policy and plan. Most countries have education databases that are updated regularly. There is a problem, however, linked to the presentation and dissemination of available data. With few exceptions, data are only published in cumbersome statistical yearbooks that contain excessive raw data and a dearth of analysis. Decision-makers need an easier document to read and interpret, one that is more analytical and more relevant (ETF, 2003).

Accordingly, there was a need for indicator documents that report on the functioning of the education system in all its aspects with a small number of relevant indicators, that are simple, easy to read, accessible, defined at a high level of aggregation putting all data on education into a single, all encompassing set. To meet this need, several types of publications containing a range of indicators have recently appeared: UNESCO initiated the first comparative international work, the World Education Report, the OECD has substantially developed this area over the last ten years, Education at a Glance: OECD Indicators, and several publications have also come out on single countries during the same period. These have mostly been produced by Ministries of Education. The first of these were *L'état de l'école* in France and *Indicateurs de l'éducation* in Quebec (ETF, 2003).

The following sections will present on some of the indicators sets at the system level.

2. Indicator sets at system level.

A. OECD Indicators. *Education at a Glance* is the OECD's annual round-up of data and analysis on education. Partly based on economic models, it provides a rich, comparable and up-to-date array of indicators on education systems in the OECD's 30 member countries and in a number of partner economies. Each edition introduces new countries, indicators and new methodologies, the aim being to over excel both quantitatively and methodologically.

These indicators enable educational policy makers and practitioners alike to see their education systems in the light of other countries' performances and, together with OECD's country policy reviews, are designed to support and review the efforts that governments are making towards policy reform. They aim to build a profile of education on which the 'prominent specialists agree', and they function as an encyclopedia (description of actual situation) and a dictionary (highlighting trends and developments) (Sedel, 2004).

The OECD indicator set is based on basic education model of context-input-process-output at the national education system level. However, there is increasing recognition that many important features of the development, functioning and impact of education systems can only be assessed through an understanding of learning outcomes and their relationships to inputs and processes at the level of individuals and institutions. To account for this, the indicator framework distinguishes between a macro level, two meso-levels and a micro-level of education systems. These relate to:

• The education system as a whole;
• The educational institutions and providers of educational services;
• The instructional setting and the learning environment within the institutions;
• The individual participants in education and learning.

The OECD Indicator set provide information on the human and financial resources invested in education, on how education and learning systems operate and evolve, and on the returns to educational investments. They are presented within an organizing framework as described in the following matrix (Figure 3). Our main concern in this paper is the education indicators at the system level, i.e. level four.

The various components of the model defined at level of national education system and their respective indicators are presented below:

Context indicators refer to characteristics of the society at large and structural characteristics of national education systems. Examples are:

- Demographics; relative size of school-age population;
- Basic financial and economic context; e.g. GDP per capita
- Educational goals and standards by level of education; equitable distribution of university graduates, high completion rate.
- Structure of schools in country, as characterized by International Standard Classification of Education (ISCED-97).

Input indicators refer to financial and human resources invested in education. Examples are:

- Expenditure per student,
- Expenditure on Research &Development in education,
- Percentage of total labor force employed in education,
- Pupil teacher ratios per education level,
- Characteristics of the stock of 'human resources' in terms of age, gender, experience, qualifications and salaries of teachers.

Figure 3. OECD Organizing Framework

	1. Education and learning outputs and outcomes	2. Policy levers and contexts shaping educational outcomes	3. Antecedents or constraints that contextualize policy
I. Individual participants in education and learning	**1.I** The quality and distribution of individual educational outcomes	**2.I** Individual attitudes, engagement and behaviour	**3.I** Background characteristics of the individual learners
II. Instructional settings	**1.II** The quality of instructional delivery	**2.II** Pedagogy and learning practices and classroom climate	**3.II** Student learning conditions and teacher working conditions
III. Providers of educational services	**1.III** The output of educational institutions and institutional performance	**2.III** School environment and organization	**3.III** Characteristics of the service providers and their communities
IV. The education system as a whole	**1.IV** The overall performance of the education system	**2.IV** System-wide institutional settings, resource allocations and policies	**3.IV** The national educational, social, economic and demographic contexts

Education at a Glance: OECD Indicators 2007.

Process indicators are characteristics of learning environment and organization of schools that are defined at system level. Examples are:

- Pattern of centralization/decentralization specified as proportion of decisions taken in a particular domain at a particular administrative level.
- Priorities in intended curriculum per education level, expressed as teaching time per subject.
- Priorities in education reform agenda, expressed for example as proportion of total education budget to specific reform programs.

- Investments and structural arrangements for system level monitoring and evaluation at a given point in time.

Output or outcome indicators refer to statistics on access and participation, attainment and aggregated data on educational achievement. Examples are:

- Participation rates in various education levels
- Progression through the education system, drop out rates,
- Average achievement in basic curricula areas measured at end of primary or secondary,
- Cross curricular competences

Impact or long-term outcome indicators. Changes in other sectors of society that can be seen as effect of education like

- Impact of education on youth unemployment ,
- Income related to education and training level,
- Delinquency rate per level of educational attainment.

The full list of OECD indicators at system level are presented in Appendix. The OECD Indicators project main function is to offer data to be interpreted and used for different purposes at different levels of the state and education system. Results should not be considered to have meanings of their own but instead to obtain their meaning in the context of the totality of the indicators. Should not interpret isolated data, but use indicator data in context and not as a number of isolated facts that have little meaning in themselves (Walin, 1995).

B. European Commission (EU).

1. 'Sixteen Quality Indicators'. The EU Sixteen Quality Indicators Report (2000) was developed with the objective of identifying a limited number of key indicators 'to assist national evaluation of systems in the area of school standards'. It adopts the conceptual framework of OECD INES indicator set and includes four indicator categories: Context, input, process, and outcomes/impact. Under EU model, indicators included under each category are
    - Input: resources and structures
    - Process: monitoring of education
    - Outcomes: attainment, success, and transition
    - Context and Impact indicators were not defined.

    The complete set includes the following indicators by category:
    Indicators on Attainment (outcomes)
    1. Mathematics
    2. Reading
    3. Science
    4. Information and Communication Technology
    5. Foreign languages
    6. learning to learn
    7. Civics

Indicators on Success and Transition (outcomes)

8. Drop-out rates
9. Completion of upper secondary education
10. Participation in tertiary education.

Indicators on Monitoring of Education (process)

11. evaluation and steering of school education
12. Parents' participation

Indicators on resources and structures (input)

13. education and training of teachers
14. participation in pre-primary education
15. number of students per computer
16. educational expenditure per student.

2. Fifteen Quality Indicators for Lifelong Learning, EU 2002. After the presentation of the previous report, the expert group who prepared it were asked to continue the work and to extend the initiative to cover all the strands of education and training encompassed by lifelong learning.

   "Lifelong learning is seen as encompassing all purposeful learning activity, whether formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence". Early in 2001, the working group agreed upon a limited number of relevant indicator areas. The most appropriate indicators for each of these areas have subsequently been selected.

   The fifteen quality indicators are contained in the following four areas (A-D):

   Area A: Skills, Competencies and Attitudes
   1. Literacy
   2. Numeracy
   3. New Skills in the Learning Society
   4. Learning-to-Learn Skills
   5. Active Citizenship Cultural and Social Skills

   Area B: Access and Participation
   6. Access to Lifelong Learning
   7. Participation in Lifelong Learning

   Area C: Resources for Lifelong Learning
   8. Investment in Lifelong Learning
   9. Educators and Training
   10. ICT in Learning

   Area D: Strategies and System Development
   11. Strategies of Lifelong Learning
   12. Coherence of Supply

13. Counseling and Guidance
14. Accreditation and Certification
15. Quality Assurance

Their indicators are listed in Appendix. To attain quality lifelong learning, five challenges need to be overcome: The skills, competencies and attitudes challenge, the resource challenge, the challenge of social inclusion, the challenge of change, and the challenge of data and comparability.

C. UNESCO's indicator sets. To meet UNESCO's integrated vision of education quality; several indicator systems were developed that comprise UNESCO's conceptions of central dimensions of teaching and learning. Among these systems, two will be described the World Education Indicators (WEI) and Education for All (EFA).

1. World Education Indicators (WEI). The main aim of the World Education Indicators (WEI) programme is to establish a comparative perspective on key policy issues to better monitor education systems. The WEI programme, funded by World Bank and coordinated by the OECD and UNESCO, aims to address the new information needs as countries shift to more advanced stages of educational development. It has sought to: develop indicator methodologies based upon a common set of policy concerns where cross-national comparisons add value; review methods and data collection instruments and set the direction for future developmental work and analysis.

   The publication provides comparable education indicators for 63 countries covering 72% of the world's population and consists of five thematic sections which present and interpret leading education indicators for WEI countries. They are
   Section 1. The outputs of education systems
   Section 2. Sources and flows of education expenditure
   Section 3. Levels and uses of education expenditure
   Section 4. Access to education, participation and progression
   Section 5. Teachers and the learning environment

   Details of the various sections are provided in Appendix.

2. Education for All (EFA) Indicators. The Education for All movement is a global commitment to provide quality basic education for all children, youth and adults by 2015. It includes six key goal areas and reports following indicator tables:
   1. Background statistics
   2. Literacy Rates
      Literate Environment
   3. Early childhood care and education (ECCE): care
      Early childhood care and education (ECCE): education
   4. Access to primary education

5. Participation in primary education
6. Internal efficiency: repetition in primary education
7. Internal efficiency: primary education dropouts and completion
8. Participation in secondary and post-secondary non-tertiary education
9. Participation in tertiary education
   Tertiary education: distribution of students by field of study and female share in each field
10. Teaching staff in pre-primary and primary education
    Teaching staff in secondary and tertiary education
11. Commitment to education: public spending
12. Trends in basic or proxy indicators to measure EFA goals 1, 2, 3, 4 and 5.

As evident from above indicator sets, they are a combination of context, inputs and outcomes dimensions, and quality of education is seen as encompassing access, teaching and learning processes and outcomes in ways that are influenced by context and by the range and quality of inputs available.

D. World Bank.

World Bank noted that measuring the quality of education can be approached from two perspectives. First, it can be construed as *fundamental quality:* how many students have attained the basic skills (however defined) to successfully complete their courses of instruction and productively participate in the national labor market, policy, society, etc.? Second, it can be taken to reflect an education system's production of *excellence:* how many students from a particular country have entered into "world-class" research universities; or how many national universities produce "world-class" research or technicians/professionals? (World Bank, 2008, p277). Accordingly, although measurement of quality is elusive, it can be approximated by using different indicators, and World Bank has identified several under the following headings: inputs, access, equity, efficiency, and quality and outcomes.

More specifically, indicators used are the following:

A. Physical, Human and Financial Capital Inputs

- Pupil-Teacher Ratio in Primary Education
- Pupil-Teacher Ratio in Secondary Education
- Student-Teacher Ratio in Tertiary Education
- Percentage of Trained Teachers in Primary Education
- Percentage of Trained Teachers in Secondary Education
- Public Expenditure in Education as Percent of GDP
- Public Expenditure in Education as Percent of Government Spending

B. Access

- Gross Enrollment Rate in Primary Education
- Gross Enrollment Rate in Secondary Education
- Gross Enrollment Rate in Tertiary Education
- Net Enrollment Rate in Primary Education
- Gross Intake Rate to Grade 1

C. Equity

- Gender Parity Index of Primary Gross Enrollment Rate
- Gender Parity Index of Secondary Gross Enrollment Rate
- Gender Parity Index of Tertiary Gross Enrollment Rate
- Gender Parity Index of Gross Intake Rate
- Gender Parity Index of Repetition Rate in Primary Education

D. Efficiency

- Survival Rate to Grade 5
- Primary Completion Rate,
- Repetition Rate in Primary Education,
- Repetition Rate in Secondary Education,
- Dropout Rate in Primary Education,
- Dropout Rate in Secondary, Lower Secondary, and Upper Secondary Education.
- Private Enrollment Share in Primary Education.
- Private Enrollment Share in Secondary Education.
- Private Enrollment Share in Tertiary Education.

E. Quality and Outcomes

- TIMSS Score in Math of 8th Grade, 1995, 1999, and 2003.
- TIMSS Score in Science of 8th Grade, 1995, 1999, and 2003.
- Adult Literacy Rate (aged 15 and older).
- Average Years of Schooling of Adults.

V. Conclusion and Future Directions

Although the review of above international indicator systems revealed that they use different classifications, yet an eclectic interpretation of education quality is predominating, and various perspectives on quality previously discussed are sort of represented in indicator sets. The productivity and efficiency views on educational quality are evident in indicator sets with process indicators being related to outputs, to provide an impression on which factors work in a particular country and across countries.

The resources/inputs-activities/process-outcomes/impact seems best to facilitate analysis and to provide an explanatory model of education. The three components are linked by close, multidirectional relationships and are affected by the characteristics of the context or sociodemographic environment that interacts with each of the components.

In addition, a shift in major categories of indicators over time can be noted from a relatively heavy emphasis on financial indicators and attained levels of education to a completion of these indicators with indicators on educational environments and processes as well as output indicators based on international comparative assessment studies (Scheerens & Hendriks, 2004). Institutional context is emerging as an important variable in determining the quality of education systems. According to

Hoffman et al., 2004, certain 'incentive creating' institutional factors explain 75% of cross-country variation in mathematics achievement, and therefore calls for improving institutional policies as they are more effective in improving quality than revising resource policies.

Even though the current indicator sets have become quite comprehensive, and there are clear signs of their use in policy-debates, there are still some important aspects in which their impact on educational policy and practice could be strengthened (Scheerens & Hendriks, 2004).There is a need to further develop the indicator sets in the following directions:

1. Their ways of reporting need to become more theme-based, more synthetic, and more geared to policy issues.
2. More qualitative indicators and descriptive micro level information on goals and applied methods of education indicators need to be developed for use by policy makers, as these are not offered by current indicator systems.
3. Process indicators need to be emphasized and to be related to outcomes data.
4. Institutional context of education systems needs to be included in indicator sets, as it has been effective in improving quality. At its center are a nexus of inter-cutting relationships pertaining to the relative sizes of the public and private sectors, the financial bases, governance structures, the 'locus of control, and the influence of parents and community (Hoffman et al., 2004)
5. Micro-level information collected at lower aggregation levels: school, teacher/classroom and the student levels, need to be included. This will make use of educational and organizational literature on school effectiveness and will yield a more extensive set of indicators, defined at multiple levels of education systems (Scheerens, 2004). Education at a Glance has contained since 1996 information on process indicators of school functioning that have a clear association with knowledge base on teaching effectiveness, these indicators are based on school and student level surveys and are thus based on micro level information. This is also the case with respect to PISA; however the EU 'key data' lacks this perspective.
6. International indicator work should be made more available to schools and teachers and feedback should be provided to lower levels in the system.
7. The importance of national cultural contexts in the meaning and interpretation of international data should be emphasized. There is a concern for more justice to the intricacies of the national context, and several critics have voiced caution that international studies may contribute to the standardization of cognitive skills informed by a set of culturally exclusive principles and knowledge. As with all aspects of development, a balance should be struck between ensuring the relevance of education to the socio-cultural realities of learners, to their aspirations, and to the wellbeing of the nation (UNESCO EFA, 2005).
8. Some commonly used indicators sets need to be reconsidered to take into account evolving understanding of the various dimensions of quality and the recent developments in the rethinking of human capital. It is not only defined by educational attainment but by a wider set of human capital that include the ability

and motivation to learn, effective job search, and personal characteristics (Bengston, 2004).

Indicators were developed in response to the changes brought about by globalization and the new rules of the game to which governments are expected to adhere to and education systems to adjust. There has been a growth in concern with what students learn because of their educational experiences. While, until recently, the focus in assessing quality in education was on inputs, the question posed today by policy-makers is 'are students acquiring appropriate knowledge, skills, behaviors and attitudes'? The assumption is that it is possible to measure aspects of education, in particular essential aspects, with few indicators that provide information on system's quality. Such an idea supposes the existence of a point of reference, a standard or a norm on which one can base a judgment of value (Scheerens, 1995). The evaluation of quality education be it a national or/and supranational level supposes a common vision of problems and solutions amongst the participants. Research supports this supposition by showing that schooling could be more similar than different across cultures and countries (Brophy, IAE, 2000, as cited in Hoffman et al. 2004). In addition, several indications show that some principles of schooling are applicable universally, while others are much more sensitive to local and cultural variation (Hoffman et al. 2004). No matter whether these problems and solutions are cross-country or within country, rational decision-making necessitates the availability of objective information. The development of an indicators system, which is updated regularly, is essential for that purpose. Indicators are simple to implement, not very costly, and only political decision is needed to maximize the benefits of their use.

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Appendix: Examples of International Indicator Sets

I. OECD Indicators 2007

A. The Output of Educational Institutions and the Impact of Learning

A1 T o what level have adults studied?

A1.1a. Educational attainment: adult population (2005)
A1.2a. Population that has attained at least upper secondary education (2005)
A1.3a. Population that has attained tertiary education (2005)
A1.4. Fields of education (2004)
A1.5. Ratio of 25-to-34-year-olds with ISCED 5A and 30-to-39-year-olds with ISCED 6 levels of education to 55 -to-64-year-olds with ISCED 5 A and 6 levels of education, by fields of education

A2 How many students finish secondary education?

A2.1. Upper secondary graduation rates (2005)
A2.2. Trends in graduation rates at upper secondary level (1995-2005)
A2.3. Post-secondary non-tertiary graduation rates (2005)

A3 How many students finish tertiary education?

A3.1. Graduation rates in tertiary education (2005)
A3.2. Trends in tertiary graduation rates (1995-2005)
A3.3. Percentage of tertiary graduates, by field of education (2005)
A3.4. Science graduates, by gender (2005)
A3.5. Relationship between motivation in mathematics at 15 years old (PISA 2003) and tertiary-type A graduation rates, by gender
A3.6. Survival rates in tertiary education (2004)

A 4 what are students' expectations for education?

A4.1a. Percentage of students expecting to complete different levels of education
A4.2a. Percentage of students expecting to complete ISCED levels 5A or 6 by mathematics performance level (2003)
A4.3a. Percentage of students expecting to complete ISCED levels 5A or 6 by gender
A4.4. Odds ratios that students expect to complete ISCED levels 5A or 6 by socio-economic status
A4.5. Odds ratios that students expect to complete ISCED levels 5A or 6 by immigrant status

A5 What are students' attitudes towards mathematics?

A5.1. Means on students' attitudes towards mathematics, approaches to learning, and school-related indices (2003)
A5.2a. Relationship between students' attitudes towards mathematics and mathematics performance (2003)
A5.2b. Relationship between students' approaches to learning and mathematics performance
A5.2c. Relationship between school-related indices and mathematics performance

A6 What is the impact of immigrant background on student performance?

A6.1a. Differences in mathematics performance, by immigrant status (2003)
A6.2a. Percentage of native students at each level of proficiency on the mathematics scale
A6.2b. Percentage of second-generation students at each level of proficiency on the mathematics scale (2003)
A6.2c. Percentage of first-generation students at each level of proficiency on the mathematics scale
A6.3. Index of instrumental motivation in mathematics and student performance on the mathematics scale (2003).

A7 Does the socio-economic status of their parents affect students' participation in higher education

A8 How does participation in education affect participation in the labor market?

A8.1a. Employment rates and educational attainment, by gender (2005)
A8.2a. Unemployment rates and educational attainment, by gender (2005)

A8.3a. Trends in employment rates, by educational attainment (1991-2005)
A8.4a. Trends in unemployment rates by educational attainment (1991-2005)

A9 what are the economic benefits of education

A9.1a. Relative earnings of the population with income from employment (2005 or latest available year)
A9.1b. Differences in earnings between females and males (2005 or latest available year)
A9.2a. Trends in relative earnings: adult population (1997-2005)
A9.3. Trends in differences in earnings between females and males (1997-2005)
A9.4a. Distribution of the 25-to-64-year-old population by level of earnings and educational attainment (2005 or latest available year)
A9.5. Private internal rates of return for an individual obtaining.n upper secondary or post-secondary non-tertiary education ISCED ¾
A9.6. Private internal rates of return for an individual obtaining a university-level degree, ISCED 5/6 (2003)
A9.7 Public internal rates of return for an individual obtaining an upper secondary or post-secondary non-tertiary education ISCED 3/4 (2003)
A9.8. Public internal rates of return for an individual obtaining a university-level degree, ISCED 5/6 (2003)

B Financial and Human Resources Invested In Education Indicator

B1 how much is spent per student?

B1.1a. Annual expenditure on educational institutions per student for all services (2004)
B1.1b. Annual expenditure per student on core services, ancillary services and R&D (2004).
B1.2. Distribution of expenditure (as a percentage) on educational institutions compared to number of students enrolled at each level of education (2004)
B1.3a. Cumulative expenditure on educational institutions per student for all services over the theoretical duration of primary and secondary studies (2004)
B1.3b. Cumulative expenditure on educational institutions per student for all services over the average duration of tertiary studies (2004)
B1.4. Annual expenditure on educational institutions per student for all services relative to GDP per capita (2004)
B1.5. Change in expenditure on educational institutions for all services per student relative to different factors, by level of education (1995, 2004)

B2 What proportion of national wealth is spent on education?

B2.1. Expenditure on educational institutions as a percentage of GDP by levels of education (1995, 2000, 2004)
B2.2. Expenditure on educational institutions as a percentage of GDP by level of education
B2.3. Change in expenditure on educational institutions (1995, 2000, 2001, 2002, 2003, 2004)
B2.4. Expenditure on educational institutions as a percentage of GDP by source of fund and level of education (2004)

B3 how much public and private investment is there in education?

B3.1. Relative proportions of public and private expenditure on educational institutions for all levels of education (1995, 2004)
B3.2a. Relative proportions of public and private expenditure on educational institutions, as a percentage, by level of education (1995, 2004)
B3.2b. Relative proportions of public and private expenditure on educational institutions, as a percentage, for tertiary education (1995, 2004)
B3.3. Trends in relative proportions of public expenditure on educational institutions and index of change between 1995 and 2004 (1995=100 constant prices), for tertiary education (1995, 2000, 2001, 2002, 2003, 2004).

B4 What is the total public spending on education?

B4.1. Total public expenditure on education (1995, 2004)
B4.2. Distribution of total public expenditure on education (2004)

B5 How much do tertiary students pay and what public subsidies do they receive?

B5.1a. Estimated annual average tuition fees charged by tertiary-type A educational institutions for national students (academic year 2004-2005)

B5.1b. Distribution of financial aid to students in tertiary-type A education.(academic year 2004-2005)

B5.1c. Financial support to students through public loans in tertiary-type A education (academic year 2004-2005)

B5.2. Public subsidies for households and other private entities as a percentage of total public expenditure on education and GDP for tertiary education (2004)

B6 On what resources and services is education funding spent?

B6.1. Expenditure on institutions by service category as a percentage of GDP (2004)

B6.2. Expenditure on educational institutions by resource category and level of education (2004)

B7 How efficiently are resources used in education?

B7.1. Estimates of technical efficiency for primary and lower secondary public sector education.

C Access to Education, Participation and Progression

C1 How prevalent are vocational programmes?

C1.1. Upper secondary enrolment patterns (2005)

C1.2. Annual expenditure on educational institutions per student for all services, by type of programme (2004)

C1.3. Performance of 15-year-old students on the PISA mathematics scale by programme orientation (2003)

C2 Who participates in education?

C2.1. Enrolment rates, by age (2005)

C2.2. Trends in enrolment rates (1995-2005)

C2.3. Transition characteristics from age 15 to 20, by level of education (2005)

C2.4. Entry rates to tertiary education and age distribution of new entrants (2005)

C2.5. Trends in entry rates at the tertiary level (1995-2005)

C2.6. Students in tertiary education by type of institution or mode of study (2005)

C3 Who studies abroad and where?

C3.1. Student mobility and foreign students in tertiary education (2000, 2005

C3.2. Distribution of international and foreign students in tertiary education by country of origin (2005)

C3.3. Citizens studying abroad in tertiary education, by country of destination (2005)

C3.4. Distribution of international and foreign students in tertiary education by level and type of tertiary education (2005

C3.5. Distribution of international and foreign students in tertiary education by field of education (2005)

C3.6. Trends in the number of foreign students enrolled outside their country of origin (2000 to 2005)

C3.7. Percentage of tertiary qualifications awarded to international and foreign students, by type of tertiary education (2005)

C4 How successful are students in moving from education to work?

C4.1a. Expected years in education and not in education for 15-to-29-year-olds (2005)

C4.2a. Percentage of the youth population in education and not in education (2005)

C4.3. Percentage of the cohort population not in education and unemployed (2005)

C4.4a. Trends in the percentage of the youth population in education and not in education (1995-2005)

C5 Do adults participate in training and education at work?

C5.1a. Participation rate and expected number of hours in non-formal job-related education and training, by level of educational attainment (2003)

C5.1b. Expected number of hours in non-formal job-related education and training by age group and labor force status (2003)

C5.1c. Expected number of hours in non-formal job-related education and training, by level of educational attainment (2003)

D. The Learning Environment and Organization of Schools

D1 How much time do students spend in the classroom?

D1.1. Compulsory and intended instruction time in public institutions (2005)

D1.2a. Instruction time per subject as a percentage of total compulsory instruction time for 9-to-11-year-olds (2005)

D1.2b. Instruction time per subject as a percentage of total compulsory instruction time for 12-to-14-year-olds (2005)

D2 What is the student-teacher ratio and how big are classes?

D2.1. Average class size, by type of institution and level of education (2005)

D2.2. Ratio of students to teaching staff in educational institutions (2005)

D2.3. Ratio of students to teaching staff, by type of institution (2005)

D3 How much are teachers paid

D3.1. Teachers' salaries (2005)

D3.2. Change in teachers' salaries (1996 and 2005)

D3.3a. Adjustments to base salary for teachers in public institutions (2005)

D3.4. Contractual arrangements of teachers (2005)

D4 How much time do teachers spend teaching

D4.1. Organization of teachers' working time (2005)

D5 How do education systems monitor school performance?

D5.1. Evaluation of public schools at lower secondary education (2005)

D5.2. Use of information from school evaluation and accountability of public schools (lower secondary education, 2005)

II. European Commission Quality Indicators of Life Long Learning

Area A: Skills, Competencies and Attitudes

1. Literacy
Percentage of students per country at proficiency level 1 or below on the PISA reading literacy scale

2. Numeracy
Percentage of students per country below the score of 380 points on the PISA mathematical literacy scale

3. New Skills for the Learning Society
Percentage of students per country below the score of 400 points on the PISA scientific literacy scale

4. Learning-to-learn Skills
Percentage of students per country in the lower 25% of overall performance on the PISA "elaboration strategies" index.

5. Active Citizenship, Cultural and Social Skills
Qualitative, Civic knowledge and interpretative skills (IEA), Civil knowledge, civic engagement and civic attitudes across countries (IEA)

Area B: Access and Participation

6. Access to Lifelong Learning

7. Participation in Lifelong Learning
Participation in education and training of those aged 25 to 64

Area C: Resources for lifelong learning

8. Investment in Lifelong Learning
Total public expenditure on education as a percentage of GDP

9. Educators and Learning
Percentage of teachers having received education and training during the previous four weeks.

10. ICT in Learning
Percentage of households who have Internet access at home

Area D: Strategies and System Development

11. Strategies of Lifelong Learning
Member States' positions on developing lifelong learning strategies

12. Coherence of Supply

13. Counseling and Guidance

14. Accreditation and Certification

15. Quality Assurance.

Note: Some areas do not yet have measurable indicators like 6, 12-15.

III. UNESCO World Education Indicators (WEI), 2006.

Section 1. The outputs of education systems
- a. Educational attainment of the adult population
- b. Educational attainment by age group
- c. Gender differences in educational attainment
- d. Relative size of school-age population
- e. Upper secondary graduation ratios
- f. Graduation ratios in tertiary education
- g. Female graduates in tertiary education

Section 2. Sources and flows of education expenditure
- a. Total education expenditure as a share of GDP
- b. Distribution of public and private expenditure on education
- c. Public expenditure on education as a percentage of total public spending
- d. Public funding mechanisms

Section 3. Levels and uses of education expenditure
- a. Educational expenditure per student
- b. Educational expenditure per student relative to GDP per capita
- c. Differences in expenditure per student by education level
- d. Use of funds by level of education

Section 4. Access to education, participation and progression
- a. Pre-primary education expectancy
- b. Overall education expectancy
- c. Tertiary education expectancy
- d. How universal is education provision?
- e. Primary and secondary grade repetition
- f. Secondary and tertiary entry ratios
- g. Patterns of upper secondary enrolment
- h. Female participation in education

Section 5. Teachers and the learning environment
- a. Enrolment in public and private schools
- b. Enrolment in public and private tertiary institutions
- c. Pupil-teacher ratios
- d. Average class size
- e. Statutory instructional time for students
- f. Teaching hours in public schools
- g. Age distribution of teachers
- h. Teacher salary scales