

Guidelines to Revise the System of Education Indicators in Israel

Executive Summary

The Committee to Revise the System of Education Indicators in Israel

Editors: Moshe Justman and Gabriel Bukobza



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the System of Education Indicators in Israel**
Summary of Conclusions and Recommendations

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The Initiative for Applied Education Research
The Israel Academy of Sciences and Humanities
The Ministry of Education
Yad Hanadiv (The Rothschild Foundation)

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Moshe Justman

Gabriel Bukobza

Editors

Jerusalem, 2010

The Initiative for Applied Education Research
The Israel Academy of Sciences and Humanities

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The Israel Academy of Sciences and Humanities was founded in 1959. Its membership currently comprises one hundred and one top Israeli scientists and scholars. According to the Israel Academy of Sciences and Humanities Law, 1961, its principal objectives are to foster and promote scientific activity; to advise the government on research activities and scientific planning of national importance; to maintain ties with equivalent bodies abroad; to represent the Israeli scientific world at international institutes and conferences; and to publish articles that can further scholarship.

The Ministry of Education was founded in 1948, when Israel became an independent, sovereign state. Under the State Education Law, 1953, the Ministry is responsible for the education of Israeli children from preschool through high school, up to and including the twelfth grade. In addition, the Ministry is in charge of teacher-training in colleges of education. The Ministry sets both pedagogical policy (e.g., development of curricula, teaching methods and standards) and organizational policy (e.g., budgeting for the education system, logistical planning, attention to special population groups and inspection of educational institutions).

The Rothschild Foundation (Yad Hanadiv) is continuing the Rothschild family's philanthropic activity in Israel, which Baron Edmond de Rothschild began in the late nineteenth century. The Rothschild Foundation works on improving educational achievement, especially by increasing opportunities for all Israeli pupils to receive a high-quality education. The Rothschild Foundation makes cutting-edge knowledge and expertise available to education workers, thereby spurring innovation, which can improve vital components of the Israeli education system.

The Initiative for Applied Education Research was founded in late 2003 as a joint venture by the Israel Academy of Sciences and Humanities, the Ministry of Education and the Rothschild Foundation (Yad Hanadiv). The Initiative's objective is to provide decision makers with up-to-date, critically-appraised knowledge that may assist them in their efforts to improve education achievements in Israel. Issues considered by the Initiative are raised by Israeli decision makers, and are undertaken following consultations with senior officials of the Ministry of Education (MOE) as well as other stakeholders.

The Initiative for Applied Education Research was conceived along the lines of similar initiatives in the United States and Europe – in which national academies of science engage in collaborative activities to improve national education systems in frameworks designed to draw both on research findings and on past experience. It has been shown that in these countries, under specific circumstances, there is a link between improvement in students' educational achievements and the systematic use of knowledge and scientific research results by teachers, principals and policy makers.

Three working assumptions were at the core of the Initiative's establishment:

- Emerging knowledge in various disciplines – from brain research to operations research – can contribute to education policy and practice. Within the field of education and in other disciplines as well, Israel has the research capacity that can be channeled toward improving achievement in education.
- Research questions raised by decision makers' agendas can encourage education researchers to broaden their activity, and through cooperation with researchers in other disciplines, generate knowledge useful to education. Investing in the effort to provide answers to these questions often leads to the development of new theories and research tools, advancing the education system, the quality of education as a whole and educational research.
- Decision makers in the education field – from teachers to MOE directors – will want to benefit from carefully reviewed and objective consensus-based knowledge, and to contribute from their own professional experience to the further development of such knowledge.

The Initiative serves as a hub for the consulting activity which the Academy provides to the government and to other authorities in the field of education. In recent years, in response to requests from various authorities, and at the Israel Academy's initiative, such activities have expanded beyond education, leading to the formation of guidance and consulting teams for various disciplines (such as society and welfare, health and environment). An amendment to the Israel Academy of Sciences and Humanities Law, recently deliberated by the Knesset, would institutionalize and regulate the Academy's advisory role vis-à-vis the central government and other authorities, making it structurally similar to the National Research Council in the United States.

As of 2010, the Initiative operates under the Israel Academy's full auspices, and is slated to become the Division of Education within the new framework being established alongside the Israel Academy.

Preface

It is fitting that the design, planning and administration models that inform the Israeli education system should, to a great extent, be research- and evidence-based. Providing the assistance educational policy makers in Israel need to attain this goal is an activity in which the Israel Academy of Sciences and Humanities engages by virtue of its functions as mandated by the Academy Law of 1961.

The main means for mediating between the world of evidence and research and the world of educational practice is via an authoritative system of structured attributes, called indicators. The quality and reliability of the system of these indicators, to a large extent, determines whether educational policy makers can place their trust in the solid foundations of comparative research. This, however, is not sufficient; an appropriate set of indicators for the education system's use must be periodically updated to give expression to new developments and findings and enables multi-year monitoring of developments and changes.

The expert committee appointed by the Israel Academy's Initiative for Applied Education Research examined the system of indicators for education in Israel. Its findings and recommendations are hereby submitted to those working toward shaping education policy and to the interested public. As is customary in other national academies of science, this document was designed and constructed so as to examine the scientific topics entwined with the issues with which decision and policy makers grapple.

It is important to note that the members of the expert committee whose findings appear here carried out their labor through the investment of great effort, and did so voluntarily. They have the Academy's heartfelt gratitude. The Initiative's staff members greatly assisted the committee in its work and deserve much thanks and appreciation.

It is our hope that this report will bring in its wake professional, critical and fruitful discussion, and in this we see our reward.

Menahem Yaari
President
Israel Academy of Sciences and Humanities

The Committee to Revise the System of Education Indicators in Israel

The aspiration to improve the education system in Israel led the Israel Academy of Sciences and Humanities to create the Committee to Revise the System of Education Indicators in Israel. The committee was created in joint cooperation with the Ministry of Education, the National Authority for Measurement and Evaluation in Education and the Central Bureau of Statistics, and operates under the auspices of the Initiative for Applied Education Research.

Education indicators are applied in two main ways:

One is within the framework of public discourse on the quality of the education system as a whole. Indicators such as the per-student expenditure for elementary and secondary education, average class size, proportion of students eligible for a matriculation certificate or the country's ranking on international tests are used by the public as tools for comparing Israel's education system to those of other countries and to track the system's performance over time.

The second way in which indicator information is used is to promote the accountability of operational units within the education system through systematic reporting of resources, activities and achievements.

The indicators committee's task was to study methodologies used in different countries for monitoring educational systems and the changes they encounter, to determine the State of Israel's relative position in the field and to recommend relevant guidelines for refining the system of indicators used in Israel. Among other things, committee members were asked to respond to the question of which indicators would be helpful to decision makers in their work. The committee's work is intended to promote revision of the system of indicators for the benefit of the public as well as for professionals in the field - teachers, principals, local officials and Ministry of Education officials.

The members of the expert committee are senior researchers from various areas of scientific knowledge. The committee began its work in the spring of 2007, met with stakeholders and experts, commissioned scientific reviews and held meetings to clarify the information and prepare a comprehensive report. For more than two years, committee members discussed the key questions placed before them, summarized the state of existing knowledge, drew conclusions and, as a result, new directions for activity and research were laid out. In the winter of 2008 the committee held a seminar on the topic of its work.

Committee members

Prof. Moshe Justman (*Chair*), Ben Gurion University of the Negev

Dr. Bruria Agrest, Bar Ilan University

Prof. Abraham Arcavi, the Hebrew University of Jerusalem and Weizmann Institute of Science

Prof. Rami Benbenishty, Bar Ilan University

Prof. Avishai Henik, Ben Gurion University of the Negev

Prof. Michael Karayanni, the Hebrew University of Jerusalem

Prof. Moshe Zeidner, University of Haifa

Dr. Gabriel Bukobza (*Study Director*)

Acknowledgments

During the three years of its activity, the *Committee to Revise the System of Education Indicators in Israel* (indicators committee) was assisted by many experts from the fields of both research and practice. Now that the report is complete and the committee's work done, we would like to thank everyone who contributed their time, expertise and good will.¹

First, we would like to thank our colleagues who participated in two planning meetings that created the basis for the indicator committee's establishment. The committee esteems the efforts of Prof. Menahem Yaari, president of the Israel Academy of Sciences and Humanities, who initiated the committee's creation and under whose sponsorship and leadership the initial meetings took place. We also extend our heartfelt gratitude to the participants in those meetings: Dr. Muhammad Amara of the Political Science and English departments at Bar Ilan University and Beit Berl College, Prof. Michal Beller, director general of the National Authority for Measurement and Evaluation in Education (known by its Hebrew acronym, RAMA), Dr. Iddo Gal of the Department of Human Services at the University of Haifa, Mr. Yosef Gidanian, head of the Education Statistics Department at the Central Bureau of Statistics (CBS), Prof. Jacob Glazer of the Department of Management at Tel Aviv University and the Department of Economics at Boston University, Dr. Hagit Glickman, director of Research and Development at RAMA, Mr. Shmuel Har-Noy, deputy managing director of the Ministry of Education, Dr. Neri Horowitz, director of the Senior Civil Service Program at the Mandel Leadership Institute, Mr. Eli Hurvitz, deputy managing director at Yad Hanadiv (Rothschild Foundation), Prof. Yaacov Kareev of the School of Education at the Hebrew University of Jerusalem, Prof. Yaacov Katz of the School of Education at Bar Ilan University, Prof. Ruth Klinov of the Department of Economics at the Hebrew University of Jerusalem, Dr. Haggai Kupermintz of the Education Department at the University of Haifa, Dr. Adam Nir, head of the Educational Policy, Administration and Leadership program at the School of Education at the Hebrew University of Jerusalem, Dr. Dmitri Romanov, chief scientist at CBS, Ms. Dalia Sprinzak of the Ministry of Education and Mr. Ariel Weiss, executive director of Yad Hanadiv (Rothschild Foundation).

Thanks also to Prof. David K. Cohen of the University of Michigan and to Dr. Michael Feuer, director of the Division of Behavioral and Social Sciences and Education in the National Research Council (NRC), who, during their visits to Israel, contributed greatly to the second planning meeting. The committee owes special thanks to Dr. Feuer who followed the committee's work and gave of his rich experience and helped it to learn from well-known U.S. experts, including Prof. Rebecca Blank, Dr. Gary Phillips and Prof. William Dickens, the NRC's permanent professional staff and the NRC's committee for Value-Added Methodologies, headed by Prof. Henry Braun. Likewise, the committee thanks Prof. Pamela Grossman of Stanford University who met with members of the committee to share her knowledge on the topic of evaluating teachers and teaching.

With its creation, the committee issued calls for proposals and commissioned scientific reviews addressing the main topics under its purview. The committee would like to thank the researchers for composing the reviews which served as its stable infrastructure: Dr. Asher Ben-Arieh, Mr. Nachum Blass, Prof. Sorel Cahan, Dr. Haggai Kupermintz, Prof. Rafi Nachmias, Dr. Inbal Shani, Dr. Jacques Silber and Prof. Ruth Zuzovsky. The committee also asked Dr. Gili Schild to submit a review of the Education Growth and Effectiveness Measures for Schools (EGEMS) tests, for which we thank her. The committee asked experts from various fields to serve as independent reviewers for the submitted reviews and would like to thank Prof. Chaim Adler, Prof. Henry Braun, Dr. Daniel Gottlieb, Ms. Ruth Ottolenghi and Mr. Noam Zussman for their great assistance. Without their close cooperation and wide-ranging assistance, the committee would have lacked critical knowledge and insights. The committee also thanks attorney Sawsan Zaher of the Adalah organization who wrote a position paper in response to one of the calls for proposals. The committee would also like to thank Dr. Analia Schlosser

¹ Names are listed in alphabetical order; affiliation is listed as it was at the time the meetings took place.

for her unwavering assistance and for the report she composed on the first CALDER (Center for Analysis of Longitudinal Data in Education Research) conference.

As an essential part of its activities, the committee invited the public to contribute to its work by sending comments, suggestions and reservations concerning the set of indicators for the education system. The committee received many responses from the public and sends its appreciation to everyone who, through their letters, enriched our knowledge and thought on significant issues regarding indicators. Special thanks go out to our friends Mr. Avinoam Granot, Dr. Eliezer Grinshpoun, Dr. Dani Steiner and Mr. Noam Zussman for their wide-ranging contribution in this regard. Particular gratitude to our colleagues who sent the committee their response letter and position as a group concerning substantial issues with respect to indicators: Prof. Chaim Adler, Prof. Miriam Ben-Peretz, Prof. Dan Inbar, Prof. Rina Shapira, Prof. Gavriel Solomon and Dr. Ami Volansky. Their interest in the topic, their clear positions and the dialogue they held with us were of great help to our work.

Committee members held many meetings with people who actually use indicators, in order to learn from their experience and hear about their needs. We would like to thank those at the Ministry of Education who hosted us, answered our questions and shared their experience with us. Thanks to Ms. Sofia Mintz, director of the ICT and Information Systems Administration, to Dr. Chaim Gatt, responsible for Methodology and Simulations, and to Mr. Yoel Douchan, responsible for the Information Center. Thank you to Mr. Eddie Hershkowitz, director of the Ministry of Education's Economic and Budgeting Administration, to Mr. Ehud Bar, statistician at the Ministry and Mr. Yedidia Segev, responsible for international data. Prof. Michal Beller, RAMA's director general worked with the committee since its inception and maintained ongoing professional and supportive contact with it throughout its activities. We thank her and Dr. Hagit Glickman, also of RAMA. The committee maintained ongoing contact with Dr. Dmitri Romanov of the CBS and met with him and two of his colleagues, Mr. Yosef Gidanian, head of the Education Statistics Department and Mr. David Maagan, in charge of the Higher Education and Teaching Force. In another context, the committee met with Lt. Col. Mark Boyar, the ground forces' head of the Knowledge Management, Fitness and Preparedness branch in the Department of Combat Theory, who described the system of indicators developed by the army. To another working meeting that took place at the Van Leer Institute, we invited educators involved in monitoring and assessment. Much thanks to Dr. Hagit Hacoheh Wolf, who is leading and developing the Karev Program's Evaluation Network, and to Mr. Avi Amram, director of the Karev Program's Evaluation Network. Thanks also to Mr. Shay Rozenberg, coordinator of the Measurement and Evaluation area at the Jerusalem Education Administration. Many thanks go to Mr. Yehoshua Zohar, principal of the ORT School at Kramim, Mr. Yoav Kousin and to Mr. Eli Eisenberg, the ORT network's director general who made the introductions. These people contributed to the committee's learning process and for this we give them our thanks.

The committee, together with the Initiative's committee on Language and Literacy, held a discussion on the topic of international tests in which Israel takes part. Taking part in the meeting and sharing their experience were Ms. Miriam Peyser of the Szold Institute, as well as professionals and experts from the Ministry of Education and RAMA: Dr. Mahmoud Abu-Fana, chief inspector for Arabic, Prof. Michal Beller, Ms. Aliza Moyal, national inspector for the sciences, Dr. Hannah Perl, chief inspector for mathematics and Ms. Mazal Shiniak, chief inspector for Hebrew.

The committee held a study seminar on 28 December 2008 entitled "Issues in the Construction of Indicators for the Israeli Education System" at the Van Leer Institute. We thank the Van Leer staff who helped produce the seminar and to all the seminar participants and those who responded with their comments – Mr. Nachum Blass, Prof. Shlomo Beck, Prof. Michal Beller, Prof. Henry Braun, Prof. Anat Zohar, director of the pedagogic secretariat at the Ministry of Education and a member of the teaching staff at the School of Education at the Hebrew University of Jerusalem, Mr. Noam Zussman of the Bank of Israel's Research Department, Prof. Jacques Silber of Bar Ilan University, Ms. Shlomit Amichai, director general of the Ministry of Education, Prof. Sorel Cahan of the Hebrew University and Prof. Yossi Shavit of Tel Aviv University. Appreciation is due

to the large audience, whose presence and productive discussions filled the Van Leer auditorium throughout the day.

The committee is very grateful to the staff of the Israel Academy of Sciences and Humanities for their assistance in fulfilling our every request and responding to the committee's needs throughout its operation.

Yad Hanadiv (Rothschild Foundation) followed the committee's work with interest and made its activities possible, for which we are grateful.

A huge bouquet of thanks to the staff of the Initiative for Applied Education Research for its professional, friendly and warm support and attention throughout: thanks to Riki Fishel, Udit Nisan and Vered Gross. Many thanks to Ada Paldor, who was charged with editing the language of the report chapters and did so with much wisdom and warm-heartedness. Special thanks to the Initiative's director, Dr. Avital Darmon, whose wise, dedicated and pleasant perseverance saw the committee's work through from its early days until publication of this final document.

In depicting the state of indicators for education in Israel, the committee relied on publicly available information and was further assisted by conversations with persons in key positions in education. To confirm that the information collected truly reflects the existing state of affairs, the committee sent relevant sections of this document to professionals in governmental bodies responsible for indicators for education. We are indebted to Prof. Michal Beller (RAMA), Dr. Dmitri Romanov (CBS) and Ms. Sofia Mintz (Ministry of Education) for their constructive and sound comments. We send our heartfelt appreciation to all.

Peer Review

The draft of the committee's document summing up its work has been given to colleagues in Israel and abroad to be reviewed. Until the document's publication, the identity of the reviewers is not known to the committee members. The peer review process is intended to ensure an external, professional, pertinent and impartial critique that will help the authors of this document improve their work and transform it into a document that will be useful at the national and international levels. We would like to thank the reviewers for reading the document and for writing their critiques.

Reviewers (listed alphabetically):

Prof. Michal Beller – Director General, National Authority for Measurement and Evaluation in Education²

Dr. Iddo Gal – Haifa University

Prof. Moshe Israelashvili – Tel Aviv University

Prof. (emeritus) Ruth Klinov – the Hebrew University of Jerusalem

Prof. Fadia Nasser Abu al-Hija – Tel Aviv University

Ms. Ruth Ottolenghi – former head, Dept. of Secondary Education, Ministry of Education

Ms. Natalia Pane – AIR (American Institute of Research)

The above mentioned reviewers provided constructive comments and suggested additions and corrections to the report draft. The reviewers were not asked to adopt the conclusions and recommendations made by the expert committee and did not see the revised version of this document before it was printed. The expert committee takes full responsibility for the final content of this document.

Moshe Justman, *Chair*

Gabriel Bukobza, *Study Director*

² The committee's work required attention to specific details within the system of education indicators used in Israel today. To re-check the validity of the analyses made, the review committee, with the approval of the expert committee, turned to Prof. Beller with a request to review this document.

The committee as a whole takes full responsibility for the entire report. The "Introduction and Summary" chapter includes the committee's major recommendations, consolidated following joint deliberation of all the committee members. The remaining chapters were each written by a different committee member, according to his or her area of expertise. The current version of the Introduction and Summary chapter was authorized by the committee members following receipt of their comments and suggestions.

The chapters and authors by order of appearance are:

Indicators for Education in Israel: Review of Existing Indicators with Emphasis on Cognitive Achievement Measurement – Gabriel Bukobza

Indicators for Quality of Teaching, Quality of Teachers and Quality of Schools – Bruria Agrest

Indicators for Gaps in and Equality of Opportunity – Michael Karayanni

Indicators of School Climate – Rami Benbenishty

Affective Indicators for Educational Settings – Moshe Zeidner

Indicators for the Field of Science and Technology Education – Abraham Arcavi

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* Reflects the content of the complete report in Hebrew.

**Report of the Committee Appointed
to Revise the System of Education Indicators in Israel**

Guidelines for Revising the System of Education Indicators in Israel

Executive Summary: Conclusions and Recommendations

1. Introduction: What are education indicators and why are they necessary?

How can we know whether the level of education that students in Israel receive rose or declined during recent years? Is there a reliable way to examine whether the content learned in the classroom corresponds to Israel's declared educational objectives? Is there a means to identify outstanding teachers and students for the purpose of encouraging them and learning from them or, alternatively, to identify schools suffering from gaps in infrastructure, so that they can be strengthened? Is there a method to coordinate the collection and use of all such data as well as other important data and relay them in a clear, comprehensible and timely manner to decision makers and the public at large in order for them to make informed decisions? How can operational use be made from the vast amount of data collected about the system of education so that the system's functioning at all levels improves, and which additional types of data should be collected for this purpose? The present report on education indicators in Israel attempts to answer these and many other similar questions.

The aim of education indicators, with which this document deals, is to inform us of the existence and nature of a particular phenomenon in the world of education, or about a change that has occurred, and to serve as a litmus test for that phenomenon. An example of this kind of indicator is the "average number of students per class." Using this measure, the degree of average classroom crowding can be tracked over time and any changes can be examined. This indicator also enables comparisons between classroom crowding in, for example, non-religious and religious-state schools, which can be informative about resource allocation in Israel's education system or, alternatively, it makes it possible to compare classroom crowding in Israel to that in other countries, etc. Other examples are the proportion of 12th grade students earning matriculation certificates nationwide, at the city or school levels, comparing a cross-section of jurisdiction and types of supervision, gender and across economic status, level of parental education or the proportion of secondary school mathematics teachers with a Bachelor's degree in mathematics, and so on. Recently, there has been a growing awareness of the importance of non-cognitive elements among students and in schools – these include service to the community, learning motivation, test anxiety, mental health and other affective areas. These are not simply issues that occur alongside academic achievements, but rather they represent significant goals in and of themselves, as well as for the Ministry of Education, which defines one of the functions of school as a "home" for its students. Most indicators are quantitative, but it is possible to construct and use indicators based on a qualitative assessment of the education system, for instance, through an assessment committee that conducts formal inspections of a sample of schools and reports on the proportion of schools that meet a specified criterion.

Both in Israel and internationally, there has been a growing demand in recent years for the use of indicators and this is seen on two levels. On one level, indicators serve as a basis for public discussion about the general quality of the education system; familiar indicators used for this purpose include national expenditure on education per student, expressed as a percentage of the GDP; expenditure on education per elementary and secondary students; average class size; the country's ranking on international tests; the rate of students earning a matriculation certificate; average scores on the EGEMS tests ("Education Growth and Effectiveness Measures for Schools"), and so on. The public arena uses such indicators to compare Israel's education system to other countries and to track the performance of the country's education system over time.

The second purpose is the operational use to which indicators are applied, in response to the demand for greater accountability from operational units within the education system through systematic reporting of their activities and achievements. This demand is in line with the trend clearly articulated in "The National Education Program" (Dovrat Report) for greater accountability.

Indicator use has repercussions at both the local and national level. The fact that the indicators are used at the micro level of a specific school, principal and teacher has two important implications, which we will briefly mention. First, indicators used at the micro level influence individual people's professional fate, and thus greater levels of caution, precision and reliability are required. Second, using indicators as an oversight tool might affect the educational enterprise in unintended ways, such as changes in the teacher-student relationship and the diverting of education resources from topics that are not measured to those that are.

1.1 General issues

A discussion of education indicators is closely bound up with the objectives of education. Since the education system has many objectives, the issue is highly complex. Different people want to know different things about the education system. Some would like to know if the system is laying a good foundation for Israel's economic development; others would like to know whether it is inculcating its students with moral values; yet others are eager that the system contribute to the full utilization of each student's capabilities; other segments of the population want to know if the education system is reducing or widening the gaps between various population groups; many will want to know if students are safe at school and whether they enjoy being there; and so on. It is clearly not the committee's place to choose between these various goals, since the choice is, in principle, value as well as socially- and politically-based and varies with time as well. We therefore tried in this report to present recommendations that could be implemented to meet a wide range of possible goals.

Another fundamental question which arises in many connections is how does the system respond to the incentives it creates? This is a central criticism of indicator use: it can distort educational practice. For example, tying the professional fate of the school principal to students' success on the EGEMS tests might lead to greater resources being allocated to teaching students the subjects covered on the EGEMS in the grades being tested, at the expense of teaching other subjects to other grades.

Overemphasis on the proportion of students matriculating might cause principals to invest greater effort in "borderline" students, at the expense of both weaker and stronger students. Likewise, a school principal evaluated according to the extent of his students' rate of volunteerism might offer incentives to volunteer, thus missing the whole point of the exercise.¹

When indicators play an important role, factors that are not measured suffer from neglect - and the education system has important goals which are not measured. Primarily, scholastic achievement is measured,² but the emphasis on achievement diverts attention away from the learning process and the social and emotional developments that take place: How is class time utilized? What is the classroom atmosphere like? What is the quality of interaction between the teacher and students, and among the students themselves? To what extent does the school enrich the student's inner life? To what degree does the student enjoy, or dread, being at school?

¹ Clearly, there are ways of dealing with these phenomena, but one must be aware of the risks. The stronger the incentives, the more difficult it is to counteract their harmful influence.

² The exception to this rule is the EGEMS test, which asks at length about school climate. These questionnaires are administered each year in about half of the schools in Israel, to more than 200,000 students, grades 5-9, and about 16,000 teachers and educators who teach the subjects tested by the EGEMS in grades 1-9. It should be emphasized that Israel is a world pioneer in this respect.

1.2 Stages of the project

It is against this backdrop that, at the start of 2007, Prof. Menahem Yaari, president of the Israel Academy of Sciences and Humanities, appointed the committee to revise the system of education indicators in Israel. The committee operated under the auspices of the Initiative for Applied Education Research (the Initiative), which is a joint venture of the Israel Academy, the Ministry of Education and the Rothschild Foundation, the latter having conceived the Initiative and, from the start, funding and guiding its operations. The committee was charged with focusing on indicators as a tool for characterizing the state of education in Israel and as a means to oversee the education system's operational units for monitoring, diagnostic and policy formation and for operation purposes. The committee focused most of its attention on elementary and secondary education, but did not deal with kindergarten or higher education. The committee conducted its work in coordination with three central bodies – the Ministry of Education (MOE), the Central Bureau of Statistics and the National Authority for Measurement and Evaluation in Education (known by its Hebrew acronym, RAMA). These organizations bear the major public responsibility for constructing and publishing indicators for the Israeli education system, and it is the committee's purpose to assist them in this effort.

The committee's recommendations appear below. The relevant details and background of each recommendation appear in the "Introduction and Summary" chapter, while an in-depth discussion of each topic appears in this report's other chapters. Theoretical and practical efforts to develop indicators for the "state of education" are still at the preliminary stage, both here in Israel and in the rest of the world, and therefore some of the tools we suggest are not yet ripe for implementation but, nevertheless, it is worthwhile to learn more about them and cautiously implement them on a trial basis.

Recommendations: Indicators characterizing the general state of education in Israel

- 1) Recommendation: The system of education indicators should include a variety of indicators that reflect the broad range of the education system's goals. The public subscribes to a wide array of educational goals, hence it is not possible to construct a single measure to reflect the overall quality of the education system and multiple measures are needed.
- 2) Recommendation: As a rule, organizations that construct education indicators must ensure that they are openly and directly accessible, and user-friendly to their target groups: political decision makers, professionals within the education system, parents, students, stakeholders, regional authorities and the public at large. Appropriate dissemination, publicity and guidance are essential for promoting wide access to indicators and their educated use.
- 3) Recommendation: The Central Bureau of Statistics, together with additional relevant parties such as the Ministry of Education and the National Authority for Measurement and Evaluation in Education, the Ministry of Social Welfare and the National Insurance Institute, should track a stable sample of children and their families over the long term, from early childhood into adulthood. A longitudinal panel of this type is essential for identifying the long-term influences of education. The sample could serve as an important research tool in other fields relevant to child and adolescent development.

Scholastic achievement

- 4) Recommendation: Participation in international tests has many advantages, as an oversight tool for what is learned in the education system, and as a tuning tool to update curricula. However, decisions to divert

education resources from other uses to improve ranking on international tests should carefully weigh any potential gains against possible losses in meeting other educational objectives.

- 5) Recommendation: Interpreting Israel's ranking on international tests as an indicator of the quality of Israeli education compared to other countries raises methodological issues that dictate caution. Those responsible for implementing the tests in Israel need to educate and inform decision-makers and the general public about what can and cannot be learned from these tests.
- 6) Recommendation: As long as tests are not calibrated, or if test criteria change from year to year, caution must be exercised in using test results as a major indicator of how the education system is performing. This type of calibration under the conditions existing today is not possible, and the issue of whether it is desirable to match the curriculum and test conditions for calibration purposes must be seriously weighed.
- 7) Recommendation: It is necessary to set standards for academic achievement by grade levels, according to the state curriculum for those subjects tested by the EGEMS. The desirability of defining standards and the degree of desired structure and uniformity in the education system are questions beyond the scope of this report. However, where it is not possible to define standards, it is unclear what purpose a uniform, nationwide test serves.
- 8) Recommendation: Enhance the use of the EGEMS as a nationwide critical assessment tool (though not for purposes of school assessment) by adding subject areas and including small samples from more grade levels. Tests administered within such a framework involve lower costs and cause less disruption to the normal school routine. If the tests are administered to successive grades and part of the sample which advances year after year is preserved, they could be used as estimates of student advancement on an annual basis. This kind of information would contribute to the development of standards, as well as to improving teaching methods in the additional grades and subjects examined.
- 9) Recommendation: Evaluate the advantages and disadvantages of reporting EGEMS achievements according to the proportion of students that reach various achievement levels for particular skills.
- 10) Recommendation: RAMA and the Ministry of Education should initiate research studies to identify the statistical relationships between EGEMS results and long-term, real-life results.

Value-based objectives and affective status³

- 11) Recommendation: Improve assessment measures for values in the education system, while reflecting Israeli society's diversity and keeping within the lines dictated by Israel's democratic character, as well as parents' right to chart the direction of their children's lives. This type of assessment generates intellectual and political challenges, but is important for maintaining balance within the education system among the different objectives with which it is charged.
- 12) Recommendation: There is an urgent need to develop indicators of affective status. These indicators would be tailored to the Israeli education system, reflect its goals and be based upon established educational theories. These indicators must be tailored to and integrated with educational practice and supported by wide-ranging and thorough training that will help steer students to the learning environment most

³ The discussion of affective indicators relies on the comprehensive review of this topic. See the chapter on "Affective Indicators for Educational Settings" in the full Hebrew version of this report, p. 123.

appropriate for them, improve students' affective capabilities and enhance teachers' and other helping personnel's abilities in handling the wide range of affective behaviors.

Economic inputs

- 13) Recommendation: An appropriate definition for an indicator of national spending on education is the national expenditure per student, divided by the GDP per capita, ensuring that the expenditure line items used correspond to OECD definitions.
- 14) Recommendation: Indicators of spending on education must include itemization of spending according to its source, specifying whether it comes from the national budget, local authority budgets or funds from NGOs and household resources.
- 15) Recommendation: Construct budget indicators that show the extent to which actual government spending on education is in line with public goals.
- 16) Recommendation: Maintain stable definitions for the long-term to facilitate budget development tracking and changes in budget distribution from year to year.

Physical and technology infrastructure

- 17) Recommendation: Develop a system of indicators for the school's physical environment which, among other things, deal with its buildings, playground, maintenance, quality of the library, computer facilities, safe and equipped laboratories, health and sanitation services and security arrangements, and accessibility for people with disabilities, etc. To advance this issue, setting of standards for these areas should be completed.

Teachers⁴

- 18) Recommendation: Tracking the population of teachers on a national scale requires indicators for the scope of the teaching force relative to the number of students in the system, distribution of teachers according to scope of position, seniority and salary levels and major demographic characteristics. Likewise, teachers' professional and pedagogic levels of certification and the correspondence between subjects taught and the professional training received must be tracked.
- 19) Recommendation: Patterns of teachers' entrance into and departure from the education system should be tracked: entrance by individual background and demographic characteristics, type of training and areas of specialization and departure by reason for leaving and demographic and professional characteristics. Likewise, the system should track the success rate of various training tracks – all appropriately classified according to type of supervision, ages of students taught and subjects of instruction.

⁴ For a broader discussion of the topic see the chapter "Indicators for Quality of Teaching, Quality of Teachers and Quality of Schools" on p. 67 of the full Hebrew report.

Teaching-learning processes⁵

- 20) Recommendation: Begin construction of an indicator system for educational processes based on existing comprehensive research in the field from Israel and abroad. Constructing such a system on a nationwide scale is not easy, but can make an important contribution to advancing learning-teaching processes that successfully translate teaching inputs into learning and other achievements.

School climate, the student's well-being and satisfaction with the education system⁶

- 21) Recommendation: Indicators for measuring school climate must derive from a conceptual framework grounded in the literature and must rely on measurement tools that have been scientifically validated and tested. Existing and new measurement tools must be consistently tested for validity by examining the reciprocal relationship between measured characteristics of school climate and various academic and social attainments.
- 22) Recommendation: The climate and pedagogic environment surveys administered by RAMA are a main source of information for construction of school climate indicators and will continue to fulfill a central role in construction of this type of indicator, though there are other sources which should also be utilized. Integrating information from other sources, especially administrative information attesting to school climate and information collected via the web within the BSC system framework, and cross-referencing information from different sources will contribute to the richness and integrity of the picture obtained of school climate.
- 23) Recommendation: Indicators relating to school climate that characterize the surrounding environment in which it operates should be completed. Such characterization can rely on administrative data, a portion of which is held by the education system, while other data is recorded by law enforcement, welfare and health services, various non-governmental organizations and the Central Bureau of Statistics. It should be emphasized that implementing the process is complex and requires advance planning and coordination, as well as an understanding of the systems involved.
- 24) Recommendation: Parents' perspectives should be added to indicators of school climate, starting at the level of the individual school and continuing to the national level.

Public opinion

- 25) Recommendation: Consistent and systematic public opinion surveys regarding the education system should be conducted by an independent public body.

Gaps in and equality of opportunity⁷

- 26) Recommendation: Construct indicators for gaps in and equality of opportunity that compare academic achievement between different population groups on the EGEMS test, matriculation exams, international tests and on access to higher education.

⁵ For a broader discussion of the topic see chapters "Indicators for Quality of Teaching, Quality of Teachers and Quality of Schools" on p. 67 and "Indicators for the Field of Science and Technology Education" on p. 140 of the full Hebrew report.

⁶ Based on a broader discussion in the chapter on "Indicators of School Climate" – p. 109 in the full Hebrew report.

⁷ For an in-depth discussion, see the chapter: "Gaps in and Equality of Opportunity in Education" – p. 90 in the full Hebrew report.

- 27) Recommendation: Construct indicators for gaps in and equality of opportunity that compare the education inputs for different population groups, according to the Ministry of Education's standards on variables such as class size, teacher training, library facilities, sports facilities, computing and media facilities, equipped laboratories, size of school building, yard and more. Assessment of inputs must also include private resources added by parents, which occasionally contribute to creating socio-economic gaps.
- 28) Recommendation: In the future, develop indicators for gaps in equality of opportunity that compare different population groups on the subjective well-being of the child in school, through the student's and parents' eyes, in relation to affective development and social abilities.
- 29) Recommendation: Develop indicators that classify the degree of integration between different population groups in schools and other shared educational frameworks and their success.
- 30) Recommendation: Theoretical and empirical research regarding the validity of various indicators of gaps in and equality of opportunity in Israel must be conducted, particularly with respect to the relationship between inputs and short-term and long-term outcomes, apparent after the completion of schooling and continuing over the course of a lifetime.
- 31) Recommendation: Measuring gaps between populations with different needs and goals requires coping with complicated issues of defining objectives for equality of opportunity. Equitable distribution of resources, without discriminating against the weak, is the primary condition for equality of opportunity but, at times, is insufficient. Theoretical and empirical research that increases understanding of the complex issues raised in this connection is required.

Using education indicators for operational oversight

- 32) Recommendation: When using indicators for operational oversight, such as subject-specific school achievement tests, supplement with other means of oversight so as to reduce the distorting influence which undermines the indicator's validity. Thus, the rate of students taking the test must be tracked to ensure that no filtering has taken place; likewise, the number of teaching hours devoted to subjects not tested must be tracked to confirm that they have not been neglected.
- 33) Recommendation: Using indicators for operational oversight requires caution and precision. Even the most precise of indicators cannot stand alone and must, in parallel, be accompanied by information gained through additional means such as in-class observations, expert opinions and human judgment.
- 34) Recommendation: Making indicators of teaching quality available to assist school principals in assessing teachers' quality of teaching requires a multi-faceted approach that includes structured observation during lessons, student and parent feedback, peer (teacher) evaluations and comparisons between achievements of similar students. The value-added approach is not yet ripe for application at the level of the individual teacher.
- 35) Recommendation: Vertical oversight of schools must integrate a variety of assessment approaches, including school visits, parent and student feedback and analysis of schools' nationwide tests results, in comparison to other, similar schools.
- 36) Recommendation: In Israel, an infrastructure for use of the Value-Added Measurement (VAM) tool does not yet exist and it is preferable to begin testing this approach on a limited sample of schools. The trial should rely on the experience accumulated in the US, where schools have been evaluated using this

approach, which has shown that it must be supplemented by class observations by experts and achievement level measurement.

- 37) Recommendation: Indicators for building school profiles for public use, particularly for parents of students, must be accessible and user-friendly, even for those with a limited professional background. Profiles should provide a wealth of information about schools' physical conditions, human components, curricula offered, social and communal activities, school climate and academic achievements, as compared to other similar schools. The objective of school profiles is not to rank schools, but rather to give parents and students a tool they can use to select a suitable school.

Reports based on region and sector, etc.

- 38) Recommendation: Reports along the lines of the national or school reports should also be created for sub-cross-sections dealing with type of oversight (such as state-non-religious or state-religious) and language (Hebrew and Arabic), and for the geographic cross-sections with respect to district and local authority, both for external oversight purposes and for internal management, so that each and every organization can take account of where it stands with respect to its goals.

The education indicators organization in the future

- 39) Recommendation: Establish an independent body or designate an existing independent body that will promote compatibility among the different education indicators publicized by the Ministry of Education, the National Authority for Measurement and Evaluation in Education and the Central Bureau of Statistics, and integrate the databases from different sources. This organization should have the resources at its disposal to track up-to-date research in the field and initiate new, basic and feasible studies on topics relevant to the system of indicators for education in Israel. This body would periodically reexamine and revise the system of education indicators in Israel.

Education Indicators in Israel:

Introduction and Summary

1. Introduction

This chapter describes the committee's objectives, organization and the questions it addresses. The chapter summarizes the committee's primary findings, and describes two main types of uses for the indicators: to characterize the general state of education in Israel and as operational tools to monitor the system and improve the way it functions.

1.1 Committee objectives, composition and work methods

The committee was appointed in 2007 by Prof. Menahem Yaari, president of the Israel Academy of Sciences and Humanities, and operates under the auspices of the Initiative for Applied Education Research (the Initiative), headed by Dr. Avital Darmon. The Initiative is a joint venture of the Israel Academy, the Ministry of Education and the Rothschild Foundation, which created the Initiative and has from the start funded and guided its operations. The committee's goals were to initiate a discussion and draw up recommendations on the issue and use of indicators to characterize the state of education in Israel and as a means of oversight of operational units within the education system, specifically for monitoring, diagnostic and policy-creation purposes. The committee focused its attention on elementary and secondary school education and did not examine pre school or higher education.

The committee's method of operation is based on that of the (U.S.) National Research Council. The committee is independent and its members do not receive remuneration for their services; professional and administrative support is provided by the Initiative. The committee commissions reports from external experts on topics it finds relevant. During 2006, in advance of the committee's creation, the Israel Academy consulted three central bodies – the Ministry of Education (MOE), the Central Bureau of Statistics and the National Authority for Measurement and Evaluation in Education (known by its Hebrew acronym, RAMA). These organizations bear the major public responsibility for constructing and publishing indicators on the Israeli education system. It is the committee's purpose to assist them in this effort.

The diverse backgrounds of the committee members reflect a multi-disciplinary approach: Prof. Moshe Justman (chair), of Ben Gurion University of the Negev, is an economist specializing in education economics; Dr. Bruria Agrest, of the School of Education at Bar-Ilan University, specializes in teacher training and has in the past served as the MOE's Chief Inspector for Biology Instruction; Prof. Abraham Arcavi of the Weizmann Institute of Science specializes in mathematical education; Prof. Rami Benbenishty of the School of Social Work at Bar-Ilan University investigates violence and social climate in the education system and behavioral problems in school; Prof. Avishai Henik, a cognitive psychologist at Ben Gurion University of the Negev, served previously on an Israel Academy committee on early childhood education; Prof. Moshe Zeidner of the University of Haifa is an expert on the influence of affective skills on learning; and Prof. Michael Karayanni of the Faculty of Law at the Hebrew University of Jerusalem specializes in, among other things, perspectives on majority-minority relations. The committee coordinator is Dr. Gabriel Bukobza, who teaches at the School of Education at Tel Aviv University.

In the summer of 2007 the committee issued *requests for proposals* for background papers on a variety of topics and also directly approached several experts. The result was a series of papers which helped create the present report, available to the public on the Initiative's website (<http://education.academy.ac.il>; Indicators/

background materials. Translation to English of some of the abstracts or full papers is available through the English site: Indicators/background materials). The topics of the background papers are listed below, along with their authors' names and affiliations in parentheses.

- Teachers and teaching (Mr. Nachum Blass, consultant on education and social planning)
- Equality of opportunity (two long background papers, one by Prof. Jacques Silber of Bar Ilan University and the other by Nachum Blass, with comments by Prof. Chaim Adler, a recipient of the Israel Prize for education)
- Development of the "Education Growth and Effectiveness Measures for Schools" (EGEMS) test (Dr. Gili Schild, who was responsible for this area at the MOE prior to her retirement)
- The EGEMS structure and its uses (a detailed, critical paper by Prof. Sorel Cahan of the Hebrew University of Jerusalem, a response by Prof. Henry Braun of Boston College, and comments on Prof. Cahan's paper by Prof. Michal Beller, Director General of RAMA)
- Measuring the impact of teachers on student achievement (Dr. Analia Schlosser, Tel Aviv University)
- Science and technology education (Prof. Ruth Zuzovsky and Prof. Rafi Nachmias, both of Tel Aviv University)
- The status of the child in the education system (Prof. Asher Ben-Arieh, the Hebrew University of Jerusalem)
- Gifted students (Dr. Inbal Shani, University of Haifa)
- Affective skills (Dr. Haggai Kupermintz, University of Haifa)
- Process indicators (Dr. Adam Nir, the Hebrew University of Jerusalem)

The current chapter summarizes the committee's major findings and presents its main recommendations. The other chapters in the report are based on the commissioned background papers and draw upon the expertise of the individual chapters' authors. They also reflect the collective perspective of the committee on education indicators. While the committee as a whole takes responsibility for the contents of the report, primary authorship of the individual chapters by committee members was as follows: a general overview of the indicators, with an emphasis on measures of cognitive achievement (Dr. Gabriel Bukobza); teachers (Dr. Bruria Agrest); equality of opportunity (Prof. Michael Karayanni); measures of affect (Prof. Moshe Zeidner); school climate (Prof. Rami Benbenishty); and science-technology education (Prof. Abraham Arcavi).

The committee's recommendations range from simple, inexpensive to implement steps that use already available data to complicated, expensive measures that require further substantial methodological development and data collection. The simpler recommendations can be adopted more quickly, while the more complex measures require more time to accommodate further development, reassessment and data collection.

1.2 Framework for discussion

Education indicators are measures that provide evidence on how the education system is performing, its current status and its achievements in various dimensions.⁸ An example of such an indicator is "the average number of students per class." Using this measure, the (average) degree of crowding in classes can be tracked over time and changes in class size can be identified; classroom crowding in non-religious and religious state schools can be compared to identify patterns of resource allocation in Israel's education system across groups and over time; classroom crowding in Israel can be compared to other countries; and so on. Another example of an indicator might be the proportion of 12th grade students earning matriculation certificates nationwide or at the city or school levels with a cross-section of ownership and type of supervision, compared by gender and

⁸ For a broader general discussion of indicators, see Zuzovsky and Nachmias's review, chapters 1-5, and the introduction to Ben-Arieh's review. (Hebrew; background materials)

levels of parental education, etc. Additional examples might be the dropout rate in the transition from 10th to 11th grade compared across various sectors or the proportion of high-school mathematics teachers with a bachelor's degree in mathematics. Most indicators are quantitative, but it is possible to construct indicators based on a qualitative assessment of the education system, for instance through an assessment committee that conducts formal inspections in a sample of schools and reports on the proportion of schools that meet a specified criterion.

This report's analysis of education indicators focuses on how they are *used*.⁹ Principally, there are two ways in which education indicators are employed. One is as a basis for public discussion of the general quality of the education system. Familiar indicators used in this way include national expenditure on education per student; average class size; Israel's ranking on international tests; the proportion of students matriculating from high school; average scores on the EGEMS tests, and so on. The public arena uses such indicators to compare Israel's education system to other countries and to track the performance of the country's education system over time.

The use of education indicators in this way can be compared to (and conceptually draws upon) the use of national accounts and related measures¹⁰ to describe the general state of the economy, tracking its development over time and comparing it to other economies. These measures provide a factual basis for public discussion of policy issues. Education indicators should play a similar role vis-à-vis education policy, providing a factual basis for public debate of policy issues. But there are significant differences between the two fields: constructing aggregate education indicators is more complex because of the multiplicity and variety of goals the education system is expected to promote and because of the absence of a common denominator, in contrast to economics, where money is the common denominator. For this reason and because of other unresolved conceptual and technical issues which we will discuss below, the theoretical and practical efforts to develop indicators of the general "state of education" are still at a preliminary stage.¹¹

The second purpose to which education indicators are applied is to encourage accountability of the operational units within the education system through the systematic reporting of their achievements and performance, in the spirit of the Dovrat Report's central recommendations ("The National Education Program"). This type of use is more concrete – whether it is part of a vertical control mechanism within the administrative hierarchy of the Ministry of Education or other hierarchies, or as part of a horizontal monitoring system - e.g., utilized by parents to monitor the quality of education in the school their children attend.

There is clearly a link between this type of indicator use and their use at the national level, but the fact that in this case evaluation is being made at the "micro" level of the school, the principal and the individual teacher leads to two important implications, which will be mentioned here and expanded upon later. First, because indicators used at the micro level influence the professional fate of individuals they require greater caution, precision and reliability. Second, using indicators to monitor performance may distort the educational practice. Using indicators to monitor performance may impair the special relationship between teacher and student and

⁹ Our emphasis on the use of indicators as a guiding principle separates this discussion from others that center on the production of indicators, which focus on defining indicators, on how the data needed to construct them is gathered and on their statistical properties. Our point of departure is the needs that indicators are intended to meet and the aims for which they are constructed. This approach implies that when the same indicator is used for a number of different purposes a separate discussion is required for each purpose, as differences in target audiences, distribution channels, frequency of reporting and so on may have a critical effect on how the indicator actually influences the system, which we see as the main point. A practical implication of this approach for detailed planning of new indicators is deriving indicators from reports or presentations in which they will appear. This means, the indicator planning process should begin from the reports intended for use: first prepare sample reports (with estimated data) and distribute the reports among its intended users for comments – before formulating the collection and processing plan for construction of the indicators themselves.

¹⁰ Among major economic indicators are gross national and domestic products, GDP per capita, the unemployment rate, inflation rate, public deficit, trade balance, the Gini coefficient (of inequality), poverty rate and so on.

¹¹ These problems also arise in health-care measurement. Defining good health raises fundamental questions, especially in regard to the relative importance of increasing life expectancy versus improving the quality of life. In health-care, too, there is concern that measurement will harm the special relationship between doctor and patient.

also affect the diversion of educational resources from unreported to reported areas.¹² We are just beginning to understand these issues and to find ways of addressing them, and the tools we have are generally not yet ready for operational use. Still, we can and should continue learning about them by cautiously putting them to the test.

1.3 General issues

Perhaps the principal issue restraining growing demand for the use of education indicators is the concern that their extensive use will harm educational practice. Clearly, a school cannot be run the same way as a bank or factory: the relationships between teachers, students and the students' parents are not commercial relations (even when the school is private). If we reduce education to a commodity, we are likely to lose the unique qualities of education at its best.

Difficulties immediately arise when attempting to define the goals of education, of which the education system has many. It is impossible to discuss Israel's education indicators without reference to these goals of education. This multiplicity of goals is not exclusive to Israel's education system; all education systems internationally have a range of goals. In Israel, some of the goals are anchored in law (see box below) while others, though not explicitly stated, are entrenched in the public awareness. Consequently, different people want to know different things about the education system. Some would like to know if the system is laying a good foundation for Israel's economic development; others would like to know whether it is inculcating moral values in its students; yet others are eager that the system contribute to the full utilization of each student's capabilities; other segments of the population want to know if the education system is reducing or widening the gaps between various population groups; many will want to know if students are safe at school and whether they enjoy being there; and so on. It is clearly not the committee's place to choose between these various goals or determine their relative importance. This must be determined in the political arena.

Consequently, our discussion must be flexible enough to accommodate a broad range of potential goals.

Another fundamental question which arises in many connections is how does the system respond to the incentives it creates? A central criticism of indicator use is that it distorts educational practice. For example, tying the professional fate of the school principal to students' success on the EGEMS tests may lead to greater resources being allocated to teaching students in the grades being tested on subjects covered on the EGEMS, at the expense of teaching other subjects to other grades. Overemphasis on the proportion of students matriculating may cause principals to invest greater effort in "borderline" students at the expense of both weaker and stronger students. Likewise, a school principal evaluated according to the extent of his students' rate of volunteerism may offer incentives to volunteer, thus missing the point of the exercise.¹³

When indicators play an important role, areas that are not measured suffer from neglect - and within the education system there are important goals which are not measured. Scholastic achievement is measured,¹⁴ but the emphasis on achievement diverts attention from the learning process: How is class time utilized? What is the classroom atmosphere like? What is the quality of interaction between the teacher and students, and among the students themselves? To what extent does the school enrich the student's inner life? To what degree does the student enjoy being at school?

¹² Efforts to manage health care using economic criteria can raise similar problems. For example, publishing a physician's success rate in particular operations may deter him from treating difficult cases.

¹³ Clearly, there are ways of dealing with these phenomena but one must be aware of the risks. The stronger the incentives, the more difficult it is to counteract their harmful influence.

¹⁴ The exception to this rule is the EGEMS test, which asks at length about school climate and pedagogic environment. Each year, these questionnaires are distributed to 50% of schools, which includes more than 200,000 fifth to eighth grade students and roughly 16,000 homeroom teachers and other teachers who teach the subjects tested on the EGEMS in grades one through nine. It should be noted that Israel is a pioneer in this area.

From: State Education Law, 1953 - 2000 Amendment

2. The objectives of state education are:

- (1) To teach the individual to love his fellow man, love his people, and love his land, to be a loyal citizen of the State of Israel, who respects his parents and his family, his heritage, his cultural identity and his native tongue;
- (2) To instill those principles declared upon creation of the State of Israel and the values of the State of Israel as a Jewish and democratic state and to develop respect for human rights, fundamental liberties, democratic values, upholding the law, for others' cultures and viewpoints, and to educate toward striving for peace and tolerance between persons and peoples;
- (3) To teach the history of the Land of Israel and of the State of Israel;
- (4) To teach the Torah of Israel, the history of the Jewish people, Israel's heritage and Jewish tradition, to instill conscious remembrance of the Holocaust and its heroism and educate to honor them;
- (5) To develop boys' and girls' personalities, their own creative abilities and talents, for complete fulfillment of their abilities as individuals who live a life of value and meaning;
- (6) To ground boys' and girls' understanding in the various areas of knowledge and science, in all types of human endeavor, in the basic skills necessary for life as mature adults in a free society, and to encourage physical activity and leisure recreation;
- (7) To strengthen powers of judgment and critical faculties, to nurture intellectual curiosity, independent thought and initiative, and to develop awareness of and attentiveness to change and innovation;
- (8) To provide every boy and girl with equality of opportunity, to enable them to develop in their own way and to create an atmosphere that stimulates differences and supports them;
- (9) To cultivate involvement in Israeli society, willingness to accept duties and fulfill them with dedication and responsibility, the spirit of mutual assistance, contribution to the community, volunteerism and striving for social justice in Israel;
- (10) To develop respectful and responsible conduct toward the natural environment and a connection to the land, its landscapes, flora and fauna;
- (11) To become familiar with the unique language, culture, history, heritage and tradition of the Arab population and other population groups in the State of Israel, to recognize the equal rights of all citizens of Israel.

In addition to these basic questions, there are also fundamental "practical" questions which must be clarified. The question of to what degree the indicator measures what it is meant to measure must always be asked. For example, what does our ranking on any particular international test say about the quality of Israel's education system? Or, what conclusions can be drawn about improvement in the education system based on the increase in the proportion of students entitled to matriculation degrees? These are multi-faceted questions which combine fundamental issues (e.g., what is "quality of education") and technical issues (e.g., do the matriculation examinations maintain a uniform level of difficulty from year to year?).

Another practical question which arises in many connections is, what practical use can be made from the indicator findings? Is the indicator well-integrated in the decision-making process? Are its findings disseminated to the relevant parties in a timely manner? Is its significance understood, and is it known how to put it to use? Is there a mandate to act in light of indicator findings? In fact, publishing indicator findings which point to a problem without taking appropriate steps to remedy it might be demoralizing.

Despite these caveats, the committee has no doubt that in Israel, as in other countries, the use of indicators in the education system is accepted. Internationally this is a growing phenomenon, from which there is no turning back. While it is true that the public discussion on education occasionally makes dubious use of the available indicators, and it is generally agreed that exaggerated use will distort educational practice, there is widespread public demand both in Israel and worldwide for greater openness and transparency, and in this respect indicators play a key role.¹⁵ Thus, in writing this report, we did not ask whether indicators should

¹⁵ In the past, teachers and school principals were perceived, similarly to physicians and attorneys, as professionals who had the best interests of their charges at heart. However, times and conditions have changed and just as a doctor's opinion is no longer unconditionally accepted, neither is the value of a teacher's work. Parents demand to see facts and figures that will allow them to compare their school's performance to other schools, and the abundance of international education indicators encourages the public to make fact-based comparisons between their country's education system and those of other countries.

be used at all but rather how can the system of education indicators be enriched and enhanced and their use improved so that teachers, principals, inspectors and other education professionals, as well as regional authorities and, certainly, parents, students and the public at large have access to reliable, effective indicators to help them perform their respective functions within the education system.

2. Use of indicators to characterize the general state of education in Israel

We have stated above that the way in which the general state of education in Israel is characterized is a function of the objectives of education, as determined by society. Israel's State Education Law lists 11 such objectives, in no particular order of priority (see box above) and this still does not exhaust the full range of goals held by the public. The profusion of goals and the lack of clear priorities are the consequence of the wide range of viewpoints – cultural, religious, ideological and socioeconomic – that characterizes Israeli society. Hence, the system of education indicators must also be at least as varied as these goals for it to be evaluated from a variety of perspectives.

- 1) Recommendation: The system of education indicators should include a variety of indicators that reflect the broad range of the education system's goals. The public subscribes to a wide array of educational goals, hence it is not possible to construct a single measure to reflect the overall quality of the education system and multiple measures are needed.**

In this era of freely available information, which aspires to maximum transparency and wide public involvement, it would seem that the education system's indicators must be publicized in the most open and direct way – including via the internet - with all the required background data and explanations available so that their significance is apparent. Dissemination of results must be accompanied by a targeted publicity effort and specific explanations so that as many people as possible benefit from an educated reading of the data. Alongside the aspiration for accessibility and visibility, the organizations publicizing the data have the responsibility to do all they can to ensure their appropriate use. There will, however, certainly be unusual circumstances in which there will be a specific reason to limit access to the data.

- 2) Recommendation: As a rule, organizations that construct education indicators must ensure that they are openly and directly accessible and user-friendly to their target groups: political decision makers, professionals within the education system, parents, students, stakeholders, regional authorities and the public at large. Appropriate dissemination, publicity and guidance activities are essential for promoting wide access to indicators and their educated use.**

Most of the goals of education, whether declared by law or implicitly held by the public, are long-range goals, the achievement of which can only be determined many years after formal education has been completed.¹⁶ If we must wait until these long-term outcomes materialize, the indicators will have no practical use, except possibly for research. Hence, we need short-term indicators of educational quality which, there is reason to believe, strongly correlate with the long-term goals of education. However, we do not have sufficient empirical evidence to identify such relationships and consequently must rely largely on informed conjecture. More research on this is needed, particularly with respect to Israeli data.

¹⁶ The source for this notion is in Jean-Jacques Rousseau's influential book, *Emile: or, On Education* (1762) (Hebrew translation), which views the goal of education as preparing the child for a fulfilling life, both as an individual and as a contributing member of society. Whatever the definition of a fulfilling life, it is clear that success in attaining it can only be apparent after many years have passed, if at all.

- 3) Recommendation: The Central Bureau of Statistics, together with additional relevant parties such as the Ministry of Education and the National Authority for Measurement and Evaluation in Education, the Ministry of Social Welfare and the National Insurance Institute, should track a stable sample of children and their families over the long term, from early childhood into adulthood. A longitudinal panel of this type is essential for identifying the long-term influences of education. The sample could serve as an important research tool in other fields relevant to child and adolescent development.**

In the sections below we expand our discussion of the use of indicators to monitor the general state of education in the country, according to the following categories:

- o Scholastic achievement
- o Value-based goals and affective development
- o Education inputs and processes
- o School climate, child well-being and level of satisfaction with the education system
- o Equality of opportunity in education

2.1 Scholastic achievement

The general level of scholastic (or cognitive) achievement is currently measured via three main channels, each serving as the basis for evaluating the "state of education": international tests, matriculation exams and the EGEMS.

2.1.1 International tests

The most familiar international tests in which Israel takes part are the PISA (Program for International Student Assessment) and the TIMSS (Trends in International Mathematics and Science Study).¹⁷ The PISA tests 15 year olds for literacy in reading (in their native tongue), mathematics, problem-solving and the sciences; the TIMSS focuses on mathematics and sciences in grades four and eight. Publication of Israel's ranking on these tests is an important media event in the field of education. In the past, the results have almost always been a disappointment for the public, which sees them as a sign that the education system is failing and needs fundamental reform.

There is clearly great value in international comparisons of this kind that measure student achievement vis-à-vis external standards. Tests help identify weak points in the abilities and level of knowledge in the general population of students and within sub-groups, as well as gaps between different population groups – and this has great benefit. In addition, the multi-year tracking of Israeli students' scores, without any reference to the country's relative rank, is important as it represents another tool in studying achievement trends in the general population and its various sectors. International test content can serve as a driving force for updating school curricula and as a tool to critically assess actual implementation of changes.

At the same time, widespread use of achievement test results to compare the general level of education in Israel to that of other countries demands greater caution in several respects than is currently the norm for public discussion on the topic in Israel. First, on a general level, the tests measure only one aspect of educational activity. The purpose of education is not only to impart basic cognitive skills in core subjects. It is also meant to shape character, develop more general abilities and instill such values as love of learning, the ability for independent study, self-confidence, risk-taking, imagination, creativity, leadership, respect and consideration

¹⁷ The chapter on "Indicators for Education in Israel: Review of Existing Indicators with Emphasis on Cognitive Achievement Measurement" (p. 53 in the full Hebrew report) includes a complete list of these tests.

for others, openness, inner contentment, familiarity with culture, skepticism, self-discipline, non-violence and so on. Although they cannot be scored and ranked, their importance is certainly of no less value than the skills measured on international tests. This reservation certainly does not invalidate the other advantages of international testing. It only emphasizes its limitations as a tool for assessing the overall quality of an education system, since it relates to only a small portion of an education system's objectives.¹⁸

From a methodological perspective, there are numerous problems in using international tests to compare the quality of education in different countries. These problems are not specific to Israel, and are also true for other countries. First, the degree of success on any test depends on the topics included in the test and their correspondence to the participating countries' local curriculum. More concretely, success depends on class time spent on the topics included in the test, during the period immediately preceding testing.¹⁹ The extent of correspondence varies by country due to differences rooted in historical, cultural, economic and political circumstances that influence the educational needs of each country. In other words, the validity of the test content affects test success, but not necessarily in a way that is an indication of the quality of education.

An important example is teaching English as a foreign language. In Israel, it is universally agreed that knowledge of English is crucial for integration into global business, science and cultural spheres. However, for understandable reasons, none of the international tests examines proficiency in a foreign language.²⁰ Therefore, from the perspective of succeeding on these tests, class time devoted to the study of English as a foreign language is a waste of time. In Israel, this problem is further exacerbated by the need to study a second foreign language. In Arab sector schools, this holds across-the-board, as all students are required to study Hebrew and English as well as Arabic. In the Hebrew-language school system, many choose to study Arabic as a second foreign language while others study a different foreign language in addition to English. Though foreign language proficiency is not tested, this hardly reduces its importance nor should it lead to the conclusion that less time should be spent on teaching foreign languages. Indeed, except for proficiency in one's own native language, the humanities are not included on international tests. Although from the perspective of test scores, this, too, may be considered time wasted, many parents, and the nation as a whole, attach great value to these content areas, which play an immense role in enriching the student's inner world, in maintaining the cultural infrastructure common to Israel's citizens and in strengthening its social fabric.

Success is not only affected by the correspondence between the content areas studied in the particular country and the content areas being tested, but also by the topics selected for study within each area and the timing of their study. For example, some countries, Israel among them, include Euclidean (plane) geometry in their curriculum, while others do not. Consequently, it does not appear on international tests and thus may be perceived as a waste and inefficient use of class time. However, this does not imply that in other respects Euclidean geometry is not worth teaching. It may well be that the disciplined mode of thought acquired through its study contributes to Israel's success in science and industry and is a relative advantage, though it is also possible that the time spent on it could be better utilized in other ways. The fact that it is not included on international tests cannot be used to provide support for its being taught or not.

Another methodological difficulty stems from the need to translate the test from the original language to the local one. The test's level of difficulty is affected by the translation and even if great effort is invested in translation, the effect will not be uniform: at times the translation increases the test's difficulty and at times

¹⁸ An interesting question arises from the obvious contrast between Israel's low ranking on international mathematics and sciences tests and the success it achieves in the hi-tech industry, as well as the high academic level of Israeli universities' science and engineering departments.

¹⁹ In a lecture given in Jerusalem, Mr. Andreas Schleicher, the OECD's official in charge of PISA, claimed a strong connection between additional hours devoted to a subject of study and success in the subject, a finding which is reflected in the PISA 2006 tests.

²⁰ The US and the UK, where English is the native language, and other large countries such as France, Germany and Spanish-speaking countries, which shape the content of these international tests, have less need for a foreign language than small countries such as Israel.

it reduces it. Clearly, the problem is magnified when native tongue proficiency is tested.²¹ The only way to compare the difficulty levels for reading in different languages is after the fact. Therefore, it is not possible to totally separate the test's difficulty from the examinees' abilities: the translation cannot be calibrated so that the level of difficulty of the translated test is identical to the original. This problem is also relevant to other areas of knowledge. The need to understand the written word exists to a greater or lesser degree in every topic and the problem is not only one of literal translation. Tests are created by people living in a specific culture. This affects the test questions' phrasings and references, which further affect the level of difficulty beyond the issue of translation. Test success is thus influenced by the affinity between the local culture and the culture of the region where the test was created, and it is well known that even small differences in wording can exert a great influence on success.²² The problem created by cultural differences is even more widespread because each country's internal cultural components are different and continue to periodically change. Israel's waves of immigration throughout the years are an obvious, though not exclusive, example. The Latin American immigration to the U.S., or the Muslim and African immigration to Europe are others, from among many examples.

The public discussion which begins anew each time the results of an international test are made public generally ignores these considerations, which call into question the possibility of concluding anything about Israel's quality of education on the basis of its international ranking.²³ This may lead to undesirable practical consequences. Improving Israel's ranking through increased investment in education resources in general and class time, in particular, in order to prepare for the tests may come at the expense of education's other goals, and especially at the expense of subjects not included in the international tests, such as English or history. The potential benefit derived from possible improvement in Israel's international ranking achieved in this manner must be carefully weighed against the price of neglecting other educational goals.

- 4) **Recommendation: Participation in international tests has many advantages, as an oversight tool for what is learned in the education system, and as a tuning tool to update curricula. However, decisions to divert education resources from other uses to improve ranking on international tests should carefully weigh any potential gains against possible losses in meeting other educational objectives.**
- 5) **Recommendation: Interpreting Israel's ranking on international tests as an indicator of the quality of Israeli education compared to other countries raises methodological issues that dictate caution. Those responsible for implementing the tests in Israel need to educate and inform decision-makers and the general public about what can and cannot be learned from these tests.**

2.1.2 *Matriculation exams*

Matriculation exams are the oldest nationwide tests in Israel, and increasing the proportion of matriculating students has for many years been a central aim of the education system. A matriculation certificate is required

²¹ Substantial effort was made to regulate test difficulty by using objective measures, such as sentence length, paragraph length, frequency of word use and so on, but there is no way to validate the test's level of difficulty.

²² In an exploratory study, the National Authority for Measurement and Evaluation in Education found that even miniscule differences on the EGEMS test, such as changing the location of the legend related to a table, affect the level of test difficulty as reflected on examinees' success on that particular item. Clearly, changes in phrasing and cultural affinity from translation must have a substantial effect. See: http://cms.education.gov.il/NR/rdonlyres/EFAC3C25-5614-48AD-80E2-FC2BC9F08A25/89841/efi_09.ppt – especially slides 7 and 8 (Hebrew).

²³ Additional problems which come up in this connection are differences in the composition of the population being tested in different countries. Occasionally, this is the result of inappropriate measures taken to artificially reduce the proportion of weak students being tested (despite great efforts to thwart such actions). There are differences in students' motivation to succeed, though they have no personal incentive to do so. These variables are dependent on the cultural and social norms of each country and most certainly vary from place to place. Without further research, it is hard to gauge their impact on Israel's ranking.

for acceptance to higher education (though the growing phenomenon of academic preparatory institutes is taking their place) and, as such, the proportion of eligible students is perceived as a sign of the education system's success in making higher education accessible to more groups in the population (the discussion on providing accessibility will be expanded in section 2.5, which deals with equality of opportunity). As a result of these and other reasons, the matriculation exams constitute just about the only indicator for quality of education in secondary school, and its influence on the education system is unique.

Although it deserves its own in-depth discussion, the committee did not pursue issues concerning the central role matriculation exams play in the education system. We do call attention, however, to two aspects related to using matriculation exam results as indicators of students', schools', cities' and education systems' achievements. First, it must be emphasized that, as a single indicator, matriculation exams are limited in their ability to account for all of the education system's objectives, in general, and of secondary education, in particular. As such, disproportional emphasis on matriculation exam achievements is a formula for the distortion that stems from high-stakes testing, including the "filtering" of students unlikely to succeed on the test, teaching to the test and abandoning other important education system objectives.

Second, using the proportion of students eligible for matriculation certificates and the average scores received on the various tests as indicators of the general level of scholastic achievement also suffers from methodological problems - mainly that the tests are not calibrated for difficulty from year to year. The general methodological difficulty in this kind of calibration when the test material remains constant is one thing. Currently, there is an additional difficulty stemming from the fact that the exam study material has been revised due to curriculum changes (Ministry of Education-issued study guides specifying subjects for the matriculation exams) and because the test has been divided into different questionnaires within the same subject area. Moreover, to ensure a uniform level of difficulty that would enable comparisons, a specially designed method, based on questions which are repeated year after year, is needed. This requires that a portion of the questions be kept secret, which is not the case with matriculation exams today. It is indeed hard to know the degree to which changes of a few percentage points in average test scores from year to year reflect a change in the level of scholastic achievement or reflect fluctuations in test difficulty. Related problems include the differences in how the matriculation exams are administered in the different schools and the internal grades schools give and then use to calculate the matriculation exam grade. Significant changes were made in how the tests are administered – the Ministry of Education issued study guides specifying subjects for the matriculation exams – allowing exams to be retaken (by those who need to improve their grade) and more – were instituted for the express purpose of raising eligibility for a matriculation degree. These make it difficult to detect greater changes which manifest themselves over longer periods of time. They also make it impossible to use average scores on matriculation exams as an indicator of long-term changes in the quality of the education system.

- 6) Recommendation: As long as tests are not calibrated, or if test criteria change from year to year, caution must be exercised in using test results as a major indicator of how the education system is performing. This type of calibration under the conditions existing today is not possible, and the issue of whether it is desirable to match the curriculum and test conditions for calibration purposes must be seriously weighed.**

2.1.3 EGEMS tests

EGEMS tests in four subjects are given annually: native language (Hebrew or Arabic), mathematics, English and science and technology in grades 5 and 8, and native language in grade 2.²⁴ Each time they are administered, tests in all the subject areas from a nationally representative group of 25% of the schools are scored centrally, and 75% are scored by the school itself. The Ministry of Education is naturally aware of the test results, and

²⁴ The test includes a chapter of questions relating to the climate at the school.

while it makes use of them it does not publicize the results. General averages alone are publicized and are perceived as indicators of the education system's quality. The results of the internal EGEMS tests remain in the local school and are used for internal purposes – an outcome of the original aim of the EGEMS to - first and foremost - provide information for the needs of school principals. Recently, the National Authority for Measurement and Evaluation in Education (known as RAMA) has begun to calibrate the tests' levels of difficulty on a yearly basis and this innovation lends validity to the comparisons made. The EGEMS tests, which correspond to the state curricula for each subject, are therefore a more appropriate tool to use for identifying changes in the general level of scholastic achievement in the population. At the same time, the information it provides is limited to the grades and subjects tested and centrally graded.

The EGEMS tests are currently more appropriate for identifying changes in academic achievement levels than as an absolute characterization of achievement level.²⁵ This is due to the lack of a set of achievement standards for various content-areas at the different grade levels, which could serve as absolute criteria for assessing student achievement. In practice, the EGEMS tests themselves end up defining such standards *ex post facto* and herein lays the difficulty in interpreting their results as an absolute measure of achievement. It is certainly preferable to clearly determine the desired standards and then construct tests which assess the degree to which they have been achieved. In the absence of standards, the claim, "The state of mathematics education in grade 8 is unsatisfactory" carries less validity.²⁶ Furthermore, clear definition of standards would make public and professional discourse possible with respect to curricula, teaching and level of achievement required for each grade. The fact that Israel follows a state curriculum is an excellent point of departure for the development of standards. Moreover, where it is not possible or desirable to define standards, it is unclear whether there is a foundation for administering a uniform nationwide test such as the EGEMS.

7) Recommendation: It is necessary to set standards for academic achievement by grade levels, according to the state curriculum for those subjects tested by the EGEMS. The desirability of defining standards and the degree of desired structure and uniformity in the education system are questions beyond the scope of this report. However, where it is not possible to define standards, it is unclear what purpose a uniform, nationwide test serves.

The few subject areas and grade levels currently tested by the EGEMS raise a question regarding the desired scope of the tests.²⁷ The question has both educational and economic implications, the answer to which is context-dependent: i.e., the use to which the test is put. EGEMS tests are currently administered to very large samples, amounting to a quarter of the school population and are one measure used for school oversight (hence, their name: Education Growth and Effectiveness Measures for Schools). Adding more content-areas or expanding the test to include other grade levels entails large budget expenditures and substantial interruption to routine learning processes. Construction of national indicators, however, does not require such large sample sizes; much smaller samples are sufficient. It would thus be possible, at reasonable cost and with minor interruption, to obtain a richer picture of scholastic achievement in more subjects for additional grades. Moreover, if half the sample were preserved from year to year, measurement of the average level of achievement would be possible as would student advancement – that is, the "added value" on a national level.²⁸

²⁵ The discussion in this section relates to the use of EGEMS results as an indicator of the general level of education in the country. The major use of the test results is at the school's operational level and as an aid for teachers. These aspects will be discussed in greater detail further on.

²⁶ This disadvantage is even more relevant when different subjects are compared. For example, if 70 is the average grade nationwide on the mathematics matriculation exam and 75 is the average grade for Bible studies, there is **no** basis for inferring that students in Israel have learned Bible better than they have learned math.

²⁷ For a detailed discussion of this issue, see Prof. Sorel Cahan's background paper (in Hebrew), with responses by Prof. Michal Beller.

²⁸ Adding more subjects and grades would also enrich the database of questions available for teachers' use as a classroom tool, as detailed in the next section, 2.1.4.

- 8) Recommendation: Enhance the use of the EGEMS as a nationwide critical assessment tool (though not for purposes of school assessment) by adding subject areas and including small samples from more grade levels. Tests administered within such a framework involve lower costs and cause less disruption to the normal school routine. If the tests are administered to successive grades and part of the sample which advances year after year is preserved, they could be used as estimates of student advancement on an annual basis. This kind of information would contribute to the development of standards, as well as to improving teaching methods in the additional grades and subjects examined.**

Setting standards as the basis for the EGEMS tests raises a question about how achievement is reported. One method used today is to establish an achievement yardstick which assigns a numeric weight to each of the skills included on the test and arrives at a score which represents the average of all the questions' scores. Although this method is very much accepted, it is somewhat arbitrary. To illustrate the problem, assume that the test material includes only two skills – addition and subtraction; one student correctly answered all the addition problems but did not solve any of the subtraction problems and another student correctly answered half of the (easier) addition and subtraction problems. Which of the two students deserves a higher grade? Which one knows more? Clearly, the answers depend on the relative weight assigned to addition as opposed to subtraction and to easier vs. harder problems. It is possible to *a priori* establish these weights, but it is unclear on what basis these decisions are made; generally, weights are established, during test construction.

Another method is to define a number of cutoff points on a scale so as to determine normative achievement levels for various skills (for example: insufficient level of mastery, basic level of mastery, good level of mastery, very good level of mastery) and to report on the proportion of students reaching each of the achievement levels for the skills in question. This method is built into the federally operated *No Child Left Behind* program in the U.S. One problem discovered in implementing the *No Child Left Behind* program was that a strong incentive was created to concentrate the most effort on borderline students – those between two levels – even though, practically, this is not justified. Another problem is that this method does not yield a clear indicator of the state of education in the country, but rather a jumble of different indicators which are hard to summarize, cohere into a clear picture or track over time (without arbitrarily averaging the results). There is, however, the advantage of a picture whose complexity is an accurate reflection of a complex reality.

- 9) Recommendation: Evaluate the advantages and disadvantages of reporting EGEMS achievements according to the proportion of students that reach various achievement levels for particular skills.**

We summarize the discussion on the EGEMS right where it started: the EGEMS test as a tool is aptly suited to the construction of indicators for academic achievement in the education system. Continuing to improve it in directions that were already started on as well as in new ways is worthwhile. Long-term research is required to establish the EGEMS test's validity as an indicator of individual, multi-dimensional and long-term success, which is the true aim of the education system. To accomplish this, a panel must be created to track the tests over time, as was recommended in section 2, above.

- 10) Recommendation: RAMA and the Ministry of Education should initiate research studies to identify the statistical relationships between EGEMS results and long-term, real-life results.**

2.1.4 *Derived advantages*

Three other important advantages derive from the use of nationwide tests (of different types) for constructing indicators. One is learning lessons about curriculum structure and content – for instance, revising foci and

teaching methods. A second advantage is the greater possibility of immediately influencing the curriculum. Nationwide tests create a strong incentive to teach the material included on the test and are an effective device for promoting adoption of curriculum changes. This, for example, occurred in the US when university entrance exams included writing an essay – which led to high schools increasing the time devoted to teaching writing skills.

A third advantage is that it provides teachers with access to calibrated test items, which can help them in their work. These results can be used to compare student achievement to other similar students, to identify weak points – for example, study material which was not fully absorbed or topics which were improperly understood – and uncover gaps in the classroom, etc. RAMA and the Center for Educational Technology have compiled databases comprised of test items calibrated for level of difficulty, alongside explanations for teachers regarding the purpose of the question, its place in the curriculum, common mistakes and why those mistakes are made. High school teachers currently make use of a similar database comprised of matriculation exam questions. This information can help teachers enhance their teaching methods and better allocate classroom time. Moreover, collecting ongoing, annual test results can help establish and periodically update achievement standards.²⁹

2.2 Value-based objectives and affective status

Existing indicator systems in Israel mainly emphasize achievements in various subjects of study and, to a lesser extent, school climate. By looking at the State Education Law of 1953, 2000 Amendment, though, it is clear that most of the education system's objectives are not related to scholastic achievement. Some, for example the first goal, are value-based: "To teach the individual to love his fellow man, love his people, and love his land..." Some, like the seventh objective, relate to the child's affective development: "To strengthen powers of judgment and critical faculties, to nurture intellectual curiosity..." This section will first discuss indicators for values integration, followed by indicators for affective status.

2.2.1 Values

The State Education Law of 1953, 2000 Amendment, recounts a list of values the state education system should instill in its students. Prominent among these are:

- 1) To teach the individual to love his fellow man, love his people, and love his land, to be a loyal citizen of the State of Israel, who respects his parents and his family, his heritage, his cultural identity and his native tongue.
- 2) To instill those principles declared upon creation of the State of Israel and the values of the State of Israel as a Jewish and democratic state and to develop respect for human rights, fundamental liberties, democratic values, upholding the law, for others' cultures and viewpoints, and to educate toward striving for peace and tolerance between persons and peoples.
- 9) To cultivate involvement in Israeli society, willingness to accept duties and fulfill them with dedication and responsibility, the spirit of mutual assistance, contribution to the community, volunteerism and striving for social justice in Israel.
- 10) To develop respectful and responsible conduct toward the natural environment and a connection to the land, its landscapes, flora and fauna.

²⁹ One of the oldest and largest databases of this type was assembled by the Center for Evaluation and Monitoring at Durham University in the UK, which for a fee permits schools access to its large database on student achievement. See their site: <http://www.cemcentre.org/RenderPage.asp?LinkID=10010000>

There are many who would claim that the list is not exhaustive: for example, personal moral characteristics such as honesty, diligence and courage are missing.

Constructing indicators to measure the education system's inculcation of these values requires careful thought and planning. First, by definition, values are an internal issue of the spirit which cannot be directly observed; it is only possible to try to deduce their existence or non-existence via observed behavior or personal reports, which can, at times, be a greater reflection of societal desires than of internalized values. Second, despite the national declaration of the importance these values hold, closely tracking an individual's values, even a child's, is incompatible with democratic principles. To what degree can a school be permitted to assess whether its students are loyal citizens (a requirement which calls to mind the role of schools in other regimes)? What is the operational meaning of "striving for peace between nations"? What degree of involvement in society is required of students? To what degree can a school be permitted to examine how students relate to their parents and whether they fulfill the biblical injunction of "honor thy father and thy mother"?

However, a system of indicators that does not reflect the importance of these objectives at all and does not try to measure the degree to which they have been attained – while measuring scholastic achievement as a matter of course – assigns too much weight to those more easily measured objectives, to the detriment of the other objectives. Consequently, these other, unquantifiable objectives do not merit tracking within the scope of considerations that guide decision makers in the education system, from the Minister of Education down to the teachers and students in the classroom. One solution is to track inputs geared to instilling values, such as classroom time dedicated to protecting environmental quality. Another is to track students' behavior patterns that may manifest internalization of values – such as volunteering for social causes after school hours (for example, volunteering in hospitals or helping older people), meaningful army service (in appropriate populations), participation in inter-communal meetings whose goals are to advance tolerance and democratic values and so forth or, in contrast, instances of violence or theft, which reflect non-internalization of the values that the education system attempts to instill. Another type of indicator – of educating for tolerance and acceptance of the other – could be the degree of integration between various populations within a specific framework, whether in school or after school hours.

11) Recommendation: Improve assessment measures for values in the education system, while reflecting Israeli society's diversity and keeping within the lines dictated by Israel's democratic character, as well as parents' right to chart the direction of their children's lives. This type of assessment generates intellectual and political challenges, but is important for maintaining balance within the education system among the different objectives with which it is charged.

2.2.2 *Affective indicators*³⁰

While indicators of achievement in school subjects are the best predictors of academic achievement, affective indicators can complete the picture because they also carry independent, albeit weaker, predictive powers of academic achievement. Beyond that, but not less important, affective indicators can fulfill an important function in identifying problems of emotional and social development, as well as detecting emotional distress. The education system is a framework without par for treating these problems at their early stages, while the problems are still in development and can be prevented from becoming more severe. Moreover, measuring affective capabilities is an important component in emotional and social learning programs designed to instill important skills in these areas in a school's students.

³⁰ This discussion of affective indicators relies on a comprehensive review of this topic. See the chapter on "Affective Indicators for Educational Settings" – p. 123 in the full Hebrew report.

The functions below are among those that affective indicators can fulfill:

- Mapping the range of normative change in affective behavior in the school population
- Identifying students at risk; referral to appropriate treatment
- Tracking affective variables over time to obtain a general picture of the emotional state of students in the education system
- Assessment of the education system's performance with respect to affective objectives that were defined
- Evaluation of results of various emotional and social interventions
- Research on the relationship between affective variables and scholastic achievement

In general, there are two types of affective indicators: those that point to broad tendencies, including stable personality traits, motivation and socio-cognitive variables, and those that indicate emotional states and emotional skills affected by those same personality traits as well as by the specific conditions of a given situation. An example of one such personality / situation-dependent variable is test anxiety, which has been more extensively researched than any other similar variable in connection to education, with many studies finding a relationship between it and scholastic achievement. Zeidner and Nevo (1988) developed a Hebrew version of the Spielberger (1980) measure of test anxiety; their work can serve as an example for the development of other affective measures for the education system.

Motivation is another central topic in non-cognitive assessment. Motivation has many measures and recognizing the different kinds of motivation that prevail among students would go a long way towards improving the education system. For example, students who aspire to succeed and want to attain higher achievement than their peers should be distinguished from students whose objective is to not fail in order to not suffer peer embarrassment; the latter avoid taking on the challenges placed before them. The motivation dimension has a positive relationship to a student's belief in his or her abilities to successfully deal with various academic challenges. This belief/confidence has been demonstrated to be highly predictive of academic success, particularly for students with initially low achievements.

The student's emotional attitude - pleasure, pride, curiosity, anxiety, anger, boredom - towards a specific subject area has a direct influence on his or her individual well-being and affects achievement. These emotions affect the classroom atmosphere (thereby also affecting other students' well-being), the choice of subjects of study and, eventually, a future career choice. These emotions are distinguished along two dimensions: positive-negative and activating-deactivating. Hope, for example, is a positive-activating emotion; relief is a positive-deactivating emotion; anger is a negative-activating emotion; and, boredom is a negative-deactivating emotion. It is possible to measure the intensity and frequency of these types of emotions in relation to topics of study, the subject of roles in school, school climate, etc. Research studies have found emotional intelligence to be an important affective factor in school. "Emotional intelligence" refers to identification, processing and emotional self-control skills, which can moderate negative emotions and amplify positive ones.

There are different approaches to measuring affective indicators: using questionnaires for self-reporting, external evaluation and objective tests – a relatively new but promising field still in development. It can be difficult to interpret a self-report of emotional intelligence: it is influenced by the phrasing used in the questionnaire and different people ascribe different meanings to the answer scale and also have a natural tendency to present themselves in a positive light, etc.

External evaluation, carried out by teachers, parents and other students, provides a solution to many of these problems. There is a great deal of experience in implementing this approach in education. It is applied using a structured list of behaviors; the results received are replicable independent of the person making the evaluation.

Objective tests describe a certain event and ask the examinee how he would react. For example, a situation is presented where a group of students are engaged in an activity requiring cooperation and one of the students admits he hasn't prepared properly; in consequence, the rest of the students angrily distance him from the group.

The examinee is asked whether he agrees with their reaction. The accumulated experience with this method appears promising especially for assessing affective skills such as teamwork, leadership and communication. These tests (with minor changes) are also used as training tools.³¹

In summary, affective indicators can potentially contribute to the education system on several levels:

- a. They can be used to measure the progress of positive affective developmental achievements, one of the educational process's objectives.
- b. Affective capabilities affect scholastic achievement. Combining affective assessment with cognitive indicators can assist interventions to improve a student's achievements, as well as improve predictive abilities for future academic success.
- c. Affective indicators can be used as a tool to track the emotional state of a population group within the education system (by gender, religion, nationality, ethnic group, area, etc.).
- d. With proper training, teachers can utilize affective indicators to improve communication with their students and handle inappropriate behavior.

More work is needed in this area: research that will provide the basis for development of an assessment tool in Hebrew and in Arabic; tools suited to the population of students in Israel; far-reaching public relations to increase awareness of affective variables' importance in educational processes; training of teachers, counselors and principals in the use of tools that assess affective status as part of educational practice.³²

12) Recommendation: There is an urgent need to develop indicators of affective status. These indicators would be tailored to the Israeli education system, reflect its goals and be based upon established educational theories. These indicators must be tailored to and integrated with educational practice and supported by wide-ranging and thorough training that will help steer students to the learning environment most appropriate for them, improve students' affective capabilities and enhance teachers' and other helping personnel's abilities in handling the wide range of affective behaviors.

2.3 Inputs and processes

At present, we have techniques for measuring just a few educational outcomes and these are basically interim ones which we believe correlate with "end" results, those that are apparent only after much time has passed. It is here where there is a need to supplement scholastic achievement-based results measurements with inputs and process measures related to educational success, even if the relationship between them is not clearly understood. In addition to their instrumental value, it must be remembered that inputs and processes are important in and of themselves. Section 2.3 will discuss indicators for the general level of input in the education system and section 2.4 will deal with processes; the distribution of inputs among different groups of students will be discussed in section 2.5, which deals with equality of opportunity.

2.3.1 *Economic inputs*

The simplest education system input to measure is economic input, meaning the per-student financial expenditure on education and all its various components. The central indicator used is expenditure on education per student, normalized for wage levels in the economy. Normalization is required since the main input in the education

³¹ See, for example, Kyllonen, P. C., & Lee, S. (2005) Assessing problem solving in context. In O. Wilhelm & R. W. Engle (Eds.) *Handbook of Understanding and Measuring Intelligence* (pp. 11-25), Thousand Oaks, CA: Sage.

³² The past years have seen a great deal of work in the Psychological-Counseling Service whose goal is to impart affective skills to students and to define standards in this area. Development of affective indicators will integrate well with these processes and contribute to them.

system is manpower and the cost of manpower is directly related to the economy's overall wage level. A fair approximation utilized in most international comparisons is expenditure per student divided by the GDP per worker or per capita. Normalizing expenditure per student according to the Israeli shekel's purchase power is inappropriate for this purpose because it ignores wage differences between countries. Another question arising with respect to defining this indicator is which expenditures to include. A practical solution is to employ the accounting rules used by international organizations that regularly make these kinds of comparisons, a group led by the OECD. Indicators suitable for international comparisons can also be used for tracking annual spending on education.

13) Recommendation: An appropriate definition for an indicator of national spending on education is the national expenditure per student divided by the GDP per capita, ensuring that the expenditure sections used correspond to OECD definitions.

Overall spending on education indicates the scope of resources directed toward education but does not reveal their sources or how they are used. When discussing sources it is important to differentiate between the various contributions from the national budget, local authority budgets, funds from NGOs and other organizations from the "third sector," and household resources. These distinctions are important in revealing the government's commitment to education, to the geographic and ideological decentralization of the education system and to the privatization of education.

14) Recommendation: Indicators of spending on education must include itemization of spending according to its source, specifying whether it comes from the national budget, local authority budgets, or funds from NGOs and household resources.

It is important to detail the use made of the education budget. Among critics of the education system, many claim the problem is not the amount of resources devoted to education but rather how these resources are used. One frequently voiced claim regarding budget allocation relates to the rate of direct to indirect expenditures: What portion of the budget is earmarked for administrative overhead and what portion goes to the school? Within the school, what is the division between actual teaching and support structures, such as administration, health, counseling, coordination, etc. What is the budgetary division among the various areas of study? Another important differentiation is the budget distribution among the different grades, particularly between preschool, elementary and high school. The budget must be tracked as it is distributed to Israeli vs. Arab sector education, state-secular, state-religious or unaffiliated schools, to the center of the country vs. the periphery, to special education and mainstream, etc.³³ Budget indicators are needed that reflect the education system's objectives and can specify the extent to which actual distribution of resources is in line with declared governmental policy. The Ministry of Education's budget as it is usually presented is not suitable for this purpose, as it shows the monies available for administration, not for the activities that interest the public or the education system's long-term objectives. Moreover, in order to enable long-term tracking, stable designations must be maintained from year to year.

15) Recommendation: Construct budget indicators that show the extent to which actual government spending on education is in line with public goals.

16) Recommendation: Maintain stable definitions for the long-term to facilitate budget development tracking and changes in budget distribution from year to year.

³³ This is discussed at great length in the chapter "Gaps in and Equality of Opportunity in Education" – p. 90 in the full Hebrew report.

2.3.2 *Physical and technology infrastructure*

Aside from the functional importance of physical infrastructure as a means for advancing scholastic achievement, physical infrastructure is important in its own right because it impacts the welfare of the child while at school, including well-being, health, security and physical safety.

One systematic way to construct indicators for physical infrastructure is to establish a series of standards which define schools' desired physical environment and record the rate of schools meeting each of the standards. These standards refer to the school building, the playground, maintenance, library, equipped and safe laboratories, computer facilities, communication, health and sanitation services, security arrangements, and so on. For example, the Ministry of Education has already established a target of 10 students per computer station. The proportion of schools meeting this target is an indicator of the quality of the education system's computing infrastructure. Another important example is in the area of physical accessibility: According to the Equal Rights for People with Disabilities law as well as the new Ministry of Industry and Trade regulations on accessibility in public buildings, all public buildings, schools included, will be required to be completely accessible to all by 2018. It is important for the Ministry of Education to collect quantitative data on conditions in this area (percentage of schools which have on their own upgraded for accessibility, scope of accessibility – partial or complete, etc.) so that progress in this context can be assessed. It should be noted that more than one level can be defined for each type of infrastructure and reporting can take place on the distribution of schools according to the various levels.

17) Recommendation: Develop a system of indicators for the school's physical environment which, among other things, deals with its buildings, playground, maintenance, quality of the library, computer facilities, safe and equipped laboratories, health and sanitation services and security arrangements, accessibility for people with disabilities, etc. To promote this issue, setting of standards for these areas should be completed.

2.3.3 *Teachers*³⁴

Teachers are the most important input in the education system in terms of their impact on quality of education. We will discuss indicators for teachers as part of the overall picture of the state of the education system. In section 3, we will deal with the use of indicators for teachers in reference to operational control.

Nationally used indicators for teachers must present the status of teachers from various perspectives. First, the total number of teaching positions relative to the number of students, the current year compared to the previous one and Israel compared to other countries. The relationship between the number of students to the number of teaching positions informs us about class size and the teacher's ability to pay attention to each student. Second, the ratio between the number of teaching positions and the number of teachers, and more specifically – the distribution of teachers by scope of position and breakdown of teacher salaries forms a picture of the nature of employment in the education system. In secondary school education, for example, a familiar problem is that a full-time teaching position requires teachers to teach many classes. Examining teachers' conditions is especially important in light of the trend to reshape the teaching profession so that teachers work more hours per week and receive a higher salary.

Certainly there is interest in having national indicators so we can learn about the quality of the teaching force beyond factors such as its scale, but we do not as yet have the knowledge required to construct such indicators. We know there are qualitative differences between teachers – there are those who clearly act as catalysts for their student's advancement, more so than other teachers – but we do not know how to identify

³⁴ For a broader discussion of the topic, see the chapter on "Indicators for Quality of Teaching, Quality of Teachers and Quality of Schools" – p. 67 in the full report in Hebrew.

these teachers according to external, measurable traits. Using such statistical means as their contribution to their students' achievements would require administering a crowded schedule of tests, more than is currently standard, with all the disadvantages that this entails (we will expand on this point in section 3). At the same time, there is a need to track external characteristics such as various levels of pedagogic and professional certification and correspondence between teachers' area of training and their subject of instruction.

Additional nationwide indicators concerning the population of teachers are required to adequately plan teacher training and eventual absorption into the education system. From the demand perspective, growth forecasts by type of supervision, ages of students and subjects taught are needed, as are indicators for teachers leaving the system. Indicators are needed for the composition of the teaching force according to basic demographic features, such as age, gender, nationality, religion, geographic district and seniority; likewise, information is needed on the rate of retirement according to these same criteria as well as reason for leaving (dismissal, resignation, retirement). Regarding the supply of new teachers, indicators are needed for the education system's absorption of teachers according to type of training (teachers college, university teacher training program, university graduate retraining for those with no formal pedagogic training) according to the same demographic characteristics, and according to quality-related characteristics such as scores on selection tests (psychometric, matriculation or other exams), scholastic achievement and outcomes on certification exams. The various absorption tracks require system-related indicators that point to success rates in their studies, absorption in the system and remaining in the teaching career. The data should include all groups of teachers – those receiving their salaries from the Ministry of Education, from local authorities and from the school itself.

18) Recommendation: Tracking the population of teachers on a national scale requires indicators for the scope of the teaching force relative to the number of students in the system, distribution of teachers according to scope of position, seniority and salary levels and major demographic characteristics. Likewise, teachers' professional and pedagogic levels of certification and the correspondence between subjects taught and the professional training received must be tracked.

19) Recommendation: Patterns of teachers' entrance into and departure from the education system should be tracked: entrance by individual background and demographic characteristics, type of training and areas of specialization and departure by reason for leaving and demographic and professional characteristics. Likewise, the system should track the success rate of various training tracks – all appropriately classified according to type of supervision, ages of students taught and subjects of instruction.

2.3.4 *Teaching-learning processes*³⁵

In the past, most studies conducted to assess learning and instruction processes used statistical methods to compare the scholastic achievements of an experimental and a control group; lately, however, the use of qualitative and quantitative methods to track **processes**, not only **products**, of learning and teaching, is on the rise. When use of these methodologies began, the studies included mainly "clinical" psychological research conducted in a laboratory environment and were based on in-depth interviews with either a single student or a pair of students. While this research yielded important insights, about 15 years ago, sociological and anthropological methodologies began to be adopted for investigating learning and teaching processes as they occur in the classroom. Studies conducted employing these methods pose complicated theoretical

³⁵ For a more detailed discussion of this topic, see the chapters on "Indicators for Quality of Teaching, Quality of Teachers and Quality of Schools," p. 67 in the full Hebrew report, and "Indicators for the Field of Science and Technology Education," p. 140 in the full Hebrew report.

and methodological challenges due to classroom events' complexity and multiplicity of layers, making the development of sophisticated theoretical frameworks with which to describe and analyze teaching-learning processes a necessity.

Studies conducted utilizing these methods have already led to deep insights about how science is learned in the social environment of the classroom, where complex interactions take place between cognitive, affective and socio-cultural components, which all have a strong connection to learning. These studies have led to the creation of unique constructs and frameworks for describing and explaining learning within a social environment, and a range of qualitative and quantitative methods have been developed to describe and explain learning processes.

Many tools have been created for analyzing the learning discourse, for microscopic examination of learning interactions and tracking learned skills that transcend learning content itself – e.g., raising hypotheses and ways of testing them, ways of presenting and representing information, creating, defending or refuting certain scientific claims (see, for example, Furtak et al., 2008) and more.

Studies of the "design experiment" type which have been developed over the past 20 years assess experimental programs not only from the perspective of the achievement to which it leads but also its influence on learning processes and outputs, which are not necessarily measurable by standardized knowledge-based tests.³⁶ Studies such as these offer an intelligent basis for the design of teaching and learning principles that transcend the potential of information collected by achievement tests and attitudinal questionnaires. At the same time, these studies raise the question of whether it is possible and desirable to generalize the findings from studies conducted within a controlled and confined environment to the construction of a system of process indicators that can be used efficiently nationwide.

Answering the question of whether this kind of effort is desirable is easier. Educational outcomes have a significant relationship to the processes that give rise to them. Without constructing a system to characterize the processes, we can probably know the extent to which objectives have been met but lack knowledge about the strength of the outcomes, the nature of learning and ways it can be improved. This perception formed the basis of the TIMSS Video Study trial, through which a framework to film, code and analyze mathematics lessons in the U.S., Germany and Japan was developed. It also formed the basis of another project conducted in light of the former, the *Learner's Perspective Study* (LPS), which compared teaching-learning processes used for mathematics in 12 countries.³⁷ As the use of new information technologies in the classroom expands, so does the need for greater understanding of the educational processes involved and how they influence curricula, ways of learning, interactions among students and between teachers and students, access to information and the need for its critical evaluation and more. In this context, the necessity of evaluation and feedback in class and in school should be noted. Along with process indicators for teaching and learning, there is room for indicators that relate to the method of evaluation and its frequency and conclusions and benefits from evaluation results, etc. must be drawn.

The question of feasibility is more complex. The broad and successful research experience carried out within academic frameworks and re-purposed to focus on learning processes at the classroom level shows that this type of research is possible and yields important insights. The transition from academic research to construction of indicators for nationwide use, however, is not obvious nor problem-free: a) data-collection is an expensive process; b) the quality of coding must be good in order for it to be useful for comparing many different classes; c) indicators are normative in nature and, even if this is not the intention, the tendency is for them to be interpreted as such.

³⁶ See, for example, an early article by Brown which is widely quoted in the literature: Brown, A. L. (1992). Design Experiments: Theoretical and Methodological Challenges in Evaluating Complex Interventions in Classroom Settings, *The Journal of the Learning Sciences*, 2(2), pp. 141-178.

³⁷ Regarding the TIMSS Video Study, see for example, Stigler, J. W. & Hiebert, J. (1999) *The Teaching Gap*. New York: The Free Press. Regarding the LPS, see Clarke, D. J., Keitel, C., & Shimizu, Y. (Eds.) (2006). *Mathematics Classrooms in Twelve Countries: The Insider's Perspective*. Rotterdam: Sense Publishers.

Research can afford to describe and explain learning processes without having to commit itself to a given set of values regarding the character of learning or teaching. Indicator systems, however, by their very nature are interpreted as holding up a certain desired "standard" with respect to the attributes and principles of "desired educational practice," even if there is no general consensus about such a standard. Therefore, development of an indicator system for classroom teaching-learning processes will require effort and investment. At the same time, in light of the already accumulated knowledge in Israel and the world, we believe that such effort is warranted.

An important advance in this path was made by Prof. Robert Pianta, dean of the University of Virginia's School of Education, and his colleagues who developed a unique observation tool called Classroom Assessment Scoring System (CLASS) that enables structured monitoring of the quality of interaction that takes place between teacher and student in three areas of teaching-learning: class organization, emotional support and learning support.³⁸ Great effort and investment would be required to develop a system of indicators for teaching-learning processes in the classroom, but in light of the importance of the topic and the knowledge that has already been amassed through research worldwide and in Israel, we believe that such an effort is worthwhile.

20) Recommendation: Begin construction of an indicator system for educational processes based on existing comprehensive research in the field from Israel and abroad. Constructing such a system on a nationwide scale is not easy, but can make an important contribution to advancing learning-teaching processes that successfully translate teaching inputs into learning and other achievements.

2.4 School climate, the student's well-being and satisfaction with the education system ³⁹

A school's social and organizational climate – the prevailing atmosphere, the feeling of belonging (or of alienation) and the sense of being protected (or of being exposed to violence) – has great influence on the participants in the educational enterprise. The literature on school climate does not reflect consensus and different authors focus on wide-ranging aspects of "climate" in their writings. There are those who differentiate between school climate and pedagogic climate, some include violence between students when discussing climate and others relate only to the reactions that violence elicits (such as the sense of belonging and school involvement). Most of the definitions include variables such as the school's educational objectives, students' individual perceptions, their academic achievements, the sense of identification or alienation, the existence of homogeneous or heterogeneous groups in the school, teacher participation in decision-making, good communication (respect, concern, etc.), the connection between teachers and students, student participation in decision-making, the opportunity for students to participate in activities, communication among teachers themselves, parental involvement in the school, the relationship between the school and the community, the principal's involvement in teaching, teachers' degree of accountability, prevailing norms among peers, the emphasis placed on teamwork, awards and remuneration, consistency and clearly-defined goals and more.

2.4.1 *Fundamental principles of school climate measurement*

Several central factors play an important role in school climate and the design of indicators to reflect this field. First, the various aspects of school climate are important in and of themselves and derive from the education system's guiding values, for example, respecting the rights of students. A second reason for the interest in school climate is its direct implication for students' well-being on that islet called school. For example, teacher

³⁸ See, for example, Megan W. Stuhlman and Robert C. Pianta, "Profiles of Educational Quality in First Grade." *The Elementary School Journal* Volume 109, Issue 4, Page 323–342, Apr 2009: See also the site describing the approach: <http://www.classobservation.com/>

³⁹ Based on a broader discussion in the chapter on "Indicators of School Climate" – p. 109 in the full Hebrew report.

burn-out holds implications for students' physical and psychological well-being, not to mention the negative impact it has on school achievement. The third reason is that both theory and empirical evidence suggest that these factors play a causal role in relation to the results of the educational enterprise, that is – they have implications on students' lives and the way in which they are educated. Take, for example, a series of findings that demonstrate a connection between "school alienation" and smoking and alcohol use. Furthermore, many studies point to the role school climate can fulfill in moderating the highly positive correlation between students' socio-economic background and their academic achievements. This is an extensive research tradition whose aim is to identify the attributes and factors under a school's control that facilitate attainment of high academic achievement among students from low socio-economic backgrounds.⁴⁰

This then, is, the conceptual framework upon which the assessment of school climate rests; monitoring tools utilized must correspond with this framework and be validated by scientific research. Validation requires a separate effort from that of monitoring, as the design of monitoring tools, out of necessity, makes significant compromises in implementing research tools: monitoring tools are required to simultaneously evaluate a great number of measures under obvious constraints. Hence, a separate effort is needed to make research tools available for the validation of monitoring tools and to assist in the development of new tools.

21) Recommendation: Indicators for measuring school climate must derive from a conceptual framework grounded in the literature and must rely on measurement tools that have been scientifically validated and tested. Existing and new measurement tools must be consistently tested for validity by examining the reciprocal relationship between measured characteristics of school climate and various academic and social attainments.

2.4.2 Measuring school climate in Israel

The climate and pedagogic environment surveys which RAMA administers separately from the EGEMS tests are the major set of tools for measuring school climate in Israel and is obligatory for all schools.⁴¹ Its use is more frequent than achievement tests of different subject areas: external EGEMS tests on the subject of school climate are administered once every two years, while achievement tests are administered once every four years. To the best of our knowledge, Israel is the only country where indicators of school climate are integrated into the system of national academic achievement measurements, within which a significant number of school climate indicators are measured.

In other countries, it would seem that the most accepted measurement methodology is the use of questionnaires completed by the students themselves during class time, supplemented by telephone interviews with school personnel.⁴²

Schools and other education systems in Israel (national and also several regional districts) have developed additional techniques to assess aspects of school climate. One of the more systematic methodologies is the BSC (Best Social Climate, Erhard, 2001). The system is based on data about many aspects of school climate gathered online from students; in addition, there is a school report that diagnoses school climate and is used as the foundation for decision making with reference to the design of local interventions with the goal of improving climate. Schools that choose to use the BSC system receive support and assistance from the Psychological-

⁴⁰ According to McEvoy & Welker (2000), high-achieving schools share similar attributes, among them high academic expectations, effective leadership, vision shared by all staff members, appropriate evaluation of achievements, a sense of capability among students and students' perception of the school environment as safe. Sammons, Hillman & Mortimore (1995) identified 11 such attributes, among them, professional leadership, a common vision, home-school cooperation and ongoing monitoring of progress made in school.

⁴¹ http://cms.education.gov.il/NR/rdonlyres/B7BFDBD2-BB19-478B-BF65-06C477EF7D26/85707/AklimReportMeitzav08_f.doc

⁴² We would note that a system that assesses school climate using systematic observations made at school was not found, except for the approach used in the UK where schools are periodically subject to an in-depth evaluation process made by an external team that examines various aspects of the school.

Counseling Service with all processes related to assessment and diagnosis, up to selecting an intervention and implementing it and creating the change in the school climate. There are currently a large number of schools that continue to use the BSC in parallel with EGEMS participation.

There are also indirect measures based upon administrative data, for example that record student tardiness and presence as well as teacher turnaround. Indicators of violence and discipline can be derived from school records of students sent to the principal for discipline issues as well as from police records of violations and crimes. It is important to integrate and cross-reference any information with EGEMS results which rely on teachers' and students' self-reports. At the same time, attention should be paid when using administrative records, especially those that rely on school reporting, and caution should be exercised since school reporting can reflect school policy rather than the actual situation at the school (for instance, students sent to the principal for relatively minor infractions).

22) Recommendation: The climate and pedagogic environment surveys administered by RAMA are a main source of information for construction of school climate indicators and will continue to fulfill a central role in construction of this type of indicator, though there are other sources which should also be utilized. Integrating information from other sources, especially administrative information attesting to school climate and information collected via the web within the BSC system framework, and cross-referencing information from different sources will contribute to the richness and integrity of the picture obtained of school climate.

2.4.3 Characterizing the school's surrounding environment

In constructing an indicator system for school climate, it is important to differentiate between an individual student's perception of the climate (and its connection to his achievement level), and mechanisms which explain how the climate at the school (as an organization) affects students' performance and achievement. For example, it is important to identify how many students report that they themselves were victims of violence at school while, in parallel, examining the degree to which the school is perceived as an unsafe place. An indicator system must examine each of the teacher's and student's perspectives, but also reflect the general feeling in the school. This approach makes clear the importance of expanding the characterization of school climate to include the environment – the city, community and neighborhood – where the school is located.

Indicators constructed to characterize a school's external environment will help the education system identify schools faced with especially difficult challenges. There is great practical importance to distinguishing between poor communities with access to social resources and those communities where poverty is accompanied by phenomena pointing to breaches in the social structure. This particular dimension is characterized on the one hand by the rate of parents with criminal records and, on the other, by the number of religious organizations active in the community and its stability. Measurement of these factors requires the cooperation of several organizations and institutions, a portion of which are external to the education system and have access to different types of data: law enforcement, welfare services, health system, youth movements and other non-profit organizations and the Central Bureau of Statistics.

23) Recommendation: Indicators relating to school climate that characterize the surrounding environment in which it operates should be completed. Such characterization can rely on administrative data, a portion of which is held by the education system, while other data is recorded by law enforcement, welfare and health services, various non-governmental organizations and the Central Bureau of Statistics. It should be emphasized that implementing the process is complex and requires advance planning and coordination, as well as an understanding of the systems involved.

2.4.4 *Expanding the circle: Parents*

It is accepted practice for school climate to be assessed from the perspective of students, teachers and the principal but only in a few places are parents' perspectives included.⁴³ Measuring parents' perspectives raises complex questions regarding the degree of parents' accessibility to the measurement system, the means required to collect information from parents and the degree of possible cooperation with parents. At the same time, there is great importance to parents' viewpoints because they see directly how the school affects their children, whether on a daily basis or looking ahead to what the likely long-term effect might be: they see if their children enjoy school and also see the burden school places on them.

There is, therefore, reason to examine various ways of obtaining feedback from parents. At the first stage, for a representative sample of parents the use of periodic telephone or other surveys can be considered to obtain their perceptions of the climate at the school where their children study, the degree of their involvement in the school and their perceptions regarding the education system as a whole. In due course, it would be appropriate to encourage schools to examine, from their own perspective, school indicators that can be based upon an online school forum. Structured questionnaires, to be used by schools nationwide, can be integrated within an internet-based system. Processing can be conducted at a central point and findings transmitted to the schools. Solutions of this type will serve to augment parents' involvement, which is itself an important component of a school's climate.

24) Recommendation: Parents' perspectives should be added to indicators of school climate, starting at the level of the individual school and continuing onto the national level.

2.4.5 *Public opinion*

Democracies attach great weight to the opinions of its citizens and residents - not only of those directly involved in a particular set of circumstances (in this case, the students' parents, the students themselves and schools' teaching-related personnel), but also the public at large. Elected officials who head political systems conduct surveys to learn about the public's preferences on a number of different topics on the national agenda. This is especially true in the field of education. It was in this manner, for example, that the general sense of dissatisfaction with the school system became one of the factors leading up to the recent initiatives for reform. It is preferable, however, to systematically sample public opinion. Rather than conduct privately-funded surveys initiated by interested parties, structured inquiries should be carried out by an independent public organization that systematically and consistently assesses public opinion about the education system and enables practical use of the findings. It is unnecessary for these types of surveys to be connected with schools' assessment tools; through efficient sampling they can be conducted annually on small sample sizes. Having a central body perform the feedback process enables focus on the education system's strengths and weaknesses without the need to give the system an overall grade.

⁴³ See exceptions to the rule – the municipal education system in Memphis: <http://memphisdemo2.extranet.urbanplanet.com/sites/974cdc6f-b867-4129-8e23> and the parents' version in: 506faae79343/uploads/SCHOOL_CLIMATE_PARENTS_06-07.pdf (California Healthy Kids Survey). Also, the Initiative committee "School-Parent Relations during Early Childhood" is now discussing this topic; its findings are scheduled to be published in the summer of 2010.

25) Recommendation: Consistent and systematic public opinion surveys regarding the education system should be conducted by an independent public body.

2.5 Gaps in and equality of opportunity⁴⁴

In characterizing the state of education in Israel, tracking the average or typical level of any particular variable in the population is insufficient. The distribution of resources within the education system as well as different population group's scholastic and other achievements must be tracked so as to learn the degree to which equality of opportunity is available within the system.

Defining indicators for equality of opportunity is difficult even at the conceptual level. The extreme cases are clear: obstructing education services due to immaterial reasons, such as nationality, religion, gender, area of residence or socio-economic status certainly are inconsistent with the principle of equal opportunity, but this is obviously too limited a definition. There are many, the present committee included, who are of the opinion that at times, equality of opportunity requires affirmative action, for example, on the basis of socio-economic criteria, as recommended by the Shoshani and Dovrat Commissions.⁴⁵ This then leads to the question of "how much"? These are the issues to be discussed in this section: Which education system inputs and outputs should be tracked to learn about gaps in and equality of opportunity? To which goals is it advisable to aspire and which measures are appropriate to use?

2.5.1 Variables to be tracked

The principle of equality of opportunity in education by definition relates to opportunities realized over time, during the student's adult life in terms of income, building a family, integrating into society; these, however, are evident only after many years and cannot be used as a basis for practice in the present. Instead, short-term results and inputs are tracked, owing to their correlation with long-term results as well as their unique value. Looking at immediate results, the most common measurement relates to scholastic achievement, especially the EGEMS test, matriculation exams and international tests. However, there is certainly value in examining gaps in and equality of opportunity using opinion questionnaires, affective measures and measures of motivation, social ability and child well-being. Even if self-confidence and *joie de vivre* are no substitute for a matriculation certificate, they are valuable in and of themselves.

Along with the above, it is important to measure gaps in inputs. On the instrumental side, attention must be paid to the fact that there is a statistical correlation between inputs (such as class size) and long-term results, even if they are difficult to identify. Beyond this, inputs have their own inherent value: all parents would certainly prefer their children study in a small class in a nurturing school environment even if there is no proof that these conditions enhance school achievement. It is for this reason that gaps in inputs are important in and of themselves.

⁴⁴ For an in-depth discussion, see the chapter on "Gaps in and Equality of Opportunity in Education" – p. 90 in the full Hebrew report.

⁴⁵ Dr. Shimshon Shoshani, Committee Report to Examine the Method of Budget Allocation, Ministry of Education, Jerusalem, 2002. http://www.education.gov.il/moe/klali/download/doch_male.rtf (Hebrew) and The National Task Force to Promote Education in Israel (Dovrat Commission), The National Education Program, Ministry of Education, Jerusalem, 2005. (Hebrew)

- 26) Recommendation: Construct indicators for gaps in and equality of opportunity that compare academic achievement between different population groups on the EGEMS test, matriculation exams, international tests and on access to higher education.**
- 27) Recommendation: Construct indicators for gaps in and equality of opportunity that compare the education inputs for different population groups, according to the Ministry of Education's standards on variables such as class size, teacher training, library facilities, sports facilities, computing and media facilities, equipped laboratories, size of school building, yard and more. Assessment of inputs must also include private resources added by parents, which occasionally contribute to creating socio-economic gaps.**
- 28) Recommendation: In the future, develop indicators for gaps in equality of opportunity that compare different population groups on the subjective well-being of the child in school, through the student's and parents' eyes, his affective development and his social abilities.**

One of the accepted measures of equality of opportunity in education is the degree of integration in the school, that is, the degree of student heterogeneity in each school. Integrated study limits the possibility of discrimination against students from other socio-economic backgrounds and increases the likelihood of their benefiting from equal opportunity in education. Indeed, this rationale was behind the end to racial segregation in the US schools, beginning with the precedent set by the Supreme Court in the case known as "Brown vs. the Board of Education." The same rationale is one of the sources for the integration program in Israel, initiated by the education system approximately 40 years ago to narrow the gap between different ethnic groups. Moreover, integrating students from different socio-economic backgrounds in a common school framework (even with separate curricula) is likely to decrease the alienation between different population groups and to encourage getting to know and accept the "other."

- 29) Recommendation: Develop indicators to classify the degree of integration between different population groups in schools and other shared educational frameworks, and their success.**

A general comment: we still do not fully understand the relationship between inputs and short-term results, on the one hand, and long-term results, on the other. Theoretical and empirical research that shed light on these relationships will be an important contribution toward shaping a more efficient public educational policy and more highly relevant indicators.⁴⁶

- 30) Recommendation: Theoretical and empirical research regarding the validity of various indicators of gaps in and equality of opportunity in Israel must be conducted, particularly with respect to the relationship between inputs and short-term and long-term outcomes, apparent after the completion of schooling and continuing over the course of a lifetime.**

⁴⁶ In this way, for example, tracking the rate of teachers with teaching certificates that teach in a certain sector as compared to the rate in another sector is relevant only when there is consensus that teachers with teaching certificates make better teachers than those without certificates. If there is no significant difference between them, the comparison is not only superfluous but serves to divert attention from other factors that do make a difference.

2.5.2 Goals for equality of opportunity

At the core of the effort to track equality of opportunity is the demand that irrelevant factors, such as belonging to a minority group, should never be a basis for discriminating against any student. However, this demand is insufficient, particularly concerning situations in which there are special needs. From the input side, equal distribution does not necessarily represent equality, as Aristotle himself believed when he declared equality exists when similar things are related to on an equal basis and things that are substantially different from one another are related to differently. The problem is there is no single, universally accepted answer to the question of how much to compensate for special needs; there are only answers that vary depending on the values of the respondent. Thus, it seems reasonable to demand that the average number of students per class in both the Hebrew and Arabic speaking school sectors be equal. In general, there is no reason why it should not be so,⁴⁷ but what about when it comes to teaching English? In the Hebrew-speaking population, English is the first foreign language while in the Arabic-speaking population it is the second foreign language, after Hebrew. Should this fact be taken into account when inputs for teaching English are determined for these two populations? What constitutes "equal opportunity" in this case? Allocating the same number of teaching hours for the two groups, or adding hours for Arabic speakers? And if so, how many hours? Would these extra hours be added until they reach the same level of proficiency as the Hebrew speakers, even though under the circumstances they would end up knowing more foreign languages than Hebrew-speaking students? And, in the name of equality, must the addition of hours come at the expense of another subject? These kinds of questions do not have a single answer which can be isolated from value-laden and political decisions.

Similar questions are raised with respect to students from disadvantaged socio-economic backgrounds. These students are at a weaker starting point and there is well-grounded evidence showing that assistance provided to them at a very young age – even earlier than first grade – is likely to prove very constructive.⁴⁸ Again, the question is asked – how much should these children be helped? An extreme view holds that we should strive to wipe out any positive correlation between children's scholastic achievement and their socio-economic background but, even in kibbutzim where a very great degree of material equality exists, there is a significant correlation between children's achievements and their parents' level of education, so how can we expect this gap to disappear in the general population?⁴⁹ Clearly, the education system must reduce the dependency between background and achievement, but it is unreasonable to demand that complete independence be attained. The degree of equality of opportunity on kibbutzim is as high as it can reasonably get under normal circumstances. International studies that compare the statistical dependence between student achievement and parents' socio-economic background offer a reasonable, achievable target for the degree of dependence to aim for in Israel.⁵⁰

A similar type of question is raised with reference to students with learning disabilities. It is considered obvious that additional inputs are made available for these students, but how much? Is the purpose to provide them with a truly "equal opportunity" so that a student with a learning disability will eventually be able to choose

⁴⁷ Obviously, there are independent factors that influence class size but there should be no significant statistical difference in average class size found between the two population groups.

⁴⁸ These data are the scientific data for the Head Start program in the US.

⁴⁹ Gilboa estimates the dependence with reference to the psychometric test and finds that there is significant correlation on kibbutzim: Gilboa, Yaakov (2004) "Kibbutz education: Implications for nurturing children from low- income families." *Israel Economic Review* 2 (2) 107-123.

There are other ways to characterize the home's circumstances – for example, number of books, style of conversation in the home: Schuetz, Gabriela, Ursprung, Heinrich W. and Woessman, Ludger, *Education Policy and Equality of Opportunity* (December 2005). IZA Discussion Paper No. 1906, Bonn.

The Shoshani, Dovrat and Strauss commissions made recommendations regarding expenditures on children from different socio-economic backgrounds; the Dovrat Commission, for instance, suggested adding 50% to the neediest 10% of children as compared to children from well-to-do backgrounds. One of the problems with these recommendations is that there is no systematic basis for choosing one number over another. The greater problem is the difficulty in garnering political support for them and, as a result, they are implemented only to a very small degree.

⁵⁰ See, for example, Woessmann's studies based on the TIMSS test: Woessmann, Ludger (2004) *How Equal Are Educational Opportunities? Family Background and Student Achievement in Europe and the United States*, Bonn: IZA Discussion Paper 1284.

any profession he wants without being limited by his disability? Here is an extreme example: Can a student with dyscalculia (a learning disability which limits acquisition of arithmetic skills) request special conditions that would enable him to study accounting such that the disability would not affect his achievements? Or, should the guiding consideration be utilitarian, placing the additional investment in inputs in the present against expected future improvement in the student's employability once he enters the work force? A parallel question is raised regarding students with special abilities, scholastic or otherwise (such as art or sports): to what extent is the education system obligated to offer them equal opportunity to develop their special abilities?

A sector with a set of priorities that is clearly different from the general population poses a complex, basic challenge, especially when it comes to measuring gaps in and equality of opportunity. The ultra-Orthodox sector, for example, respects the notion of literacy but does not value secular subjects; a portion of this group does not even aspire to a high level of material comfort. This reality requires the development of special measures both for assessing gaps within the ultra-Orthodox society and for characterizing the gap between the ultra-Orthodox sector and the rest of the Jewish population. Similar problems exist in measuring the gaps between the Jewish population and various sectors in the Arab population, and amongst themselves.

31) Recommendation: Measuring gaps between populations with different needs and goals requires coping with complicated issues of defining objectives for equality of opportunity. Equitable distribution of resources, without discriminating against the weak, is the primary condition for equality of opportunity but, at times, insufficient. Theoretical and empirical research that increases understanding of the complex issues raised in this connection is required.

2.5.3 *Type of measure*

Choosing the type of measure to assess equality of opportunity raises fundamental and technical questions. The fundamental question is whether the standard used as the basis of the measure is phrased in terms of meeting a threshold or of reducing gaps. To illustrate: if class size is tracked, a standard that is phrased in terms of meeting a threshold will lead to defining an indicator that tracks, for example, the proportion of children that study in classes with more than 35 students. In contrast, a standard that examines gaps will compare the average number of students per class in the Hebrew and Arabic speaking sectors. Both approaches are valid and each one sheds light on the topic from a different angle. The same is true about indicators for equality of opportunity based on attainments in national testing. A standard that is adjusted so that each child reaches at least the basic achievement level leads to defining indicators, such as those underlying the *No Child Left Behind* (NCLB) initiative, which tracks the proportion of children that do not reach the basic threshold in a variety of subject areas.⁵¹

Another approach focuses on the statistical dependence between student achievement and their parents' background data and views the dependence as the central indicator pointing to the lack of equality of opportunity. This objective, though it may seem reasonable, is impossible to attain on a practical level (as explained above): neutralizing the effect of parents' socio-economic background is possible only to a very limited degree.

Measuring the correlation between children's achievements and their parents' characteristics has complex technical aspects: there are various ways to measure the correlation and the assorted tools have various features. This issue is formally related to measuring the correlation between parents' income and their children's, a topic accorded much attention in the literature. Prof. Silber's paper considers this issue in depth and due to the technical nature of the discussion we will not attempt to summarize it here.

⁵¹ Each year, the program determines advancement objectives for the general population and for ethnic sub-populations, with the requirement that by the year 2014 each child will attain a defined level of capability. Although this requirement is widely viewed as impossible, there are those who claim that it is the driving force behind the program's important achievements.

3. Using indicators for operational oversight in the education system

In recent years, there has been increasing demand for more efficient oversight of the education system's operational divisions with respect to three main aspects:

- Vertical oversight of the teacher, mainly by the school principal
- Vertical oversight of the school and its principal, by the Ministry of Education and its stakeholders
- Horizontal oversight of the school by parents, students, teachers and the public at large

Integrating the use of indicators within these and other oversight approaches serves to reduce their arbitrariness and to establish them on a more consistent and systematic basis. Their use is not a substitute for exercising judgment – it will still be the principal, not a computer, who decides, for example, whether to extend a particular teacher's contract; integrating indicators in the oversight process, however, will in all likelihood help him or her make a decision and, in parallel, leave more room for external oversight and better protect teachers from arbitrary decisions.

At the same time, the use of indicators to oversee operations creates incentives that can affect those being reviewed in undesirable directions, especially with respect to vertical oversight where indicator use has a more direct influence. Clearly, the purpose of this kind of oversight is to alter behavior: tying the principal's professional fate to students' achievement test results may lead him or her to identify with the goal of improving students' attainments and do all possible to raise their attainments using available means. However, these incentives also have unwanted results. They can, for example, cause the teacher to allocate more time to a subject in which students are tested at the expense of other subjects, beyond the Ministry of Education's intentions. Or, in the case of preparation for the matriculation exams, the teacher might neglect weaker students whose chances for passing the test are low, as well as stronger students who will pass without extra help, in favor of concentrating efforts on those students on the borderline between passing and failing the test.

It is thus possible to draw two conclusions. First, when rate of test success is used as a means of oversight, learning processes must be tracked in parallel, whether through the use of quantitative indicators such as dropout rate or through teachers' self-reporting, student and parent questionnaires and lesson observation. To make an analogy to the world of business, even a chain of fast-food places does not judge its franchises on the bottom line alone but inspects its branches so as to confirm that the local manager's aspiration to increase profits is not made at the expense of the product's quality or the service offered, upon which the entire chain's reputation is built. If this is the case in business, how much more so should it be in education where there is no bottom line.

The second conclusion – as compared to indicators of the general state of the education system, indicators used for operational oversight require greater caution and precision. Indicators of the general state of the education system have a more abstract character and are not used for drawing conclusions about people, as is the case for indicators used for operational oversight, especially for vertical oversight. Inherent in vertical oversight is the potential of causing direct professional damage to people and therefore it cannot be, or appear to be, unfair, random or arbitrary. A biased or imprecise indicator can arouse professional opposition to its use and may not withstand legal scrutiny. Furthermore, even the best available indicators are not precise enough to stand on their own and, thus, their exclusive use can cause damage. It is therefore necessary that additional means of oversight be used, such as observations, expert opinions and human judgment in order to moderate their influence, as we will explain below.

32) Recommendation: When using indicators for operational oversight such as subject-specific school achievement tests, supplement with other means of oversight so as to reduce the distorting influence which undermines the indicator's validity. Thus, the rate of students taking the test must be tracked

to ensure that no filtering has taken place; likewise, the number of teaching hours devoted to subjects not tested must be tracked to confirm that they have not been neglected.

33) Recommendation: Using indicators for operational oversight requires caution and precision. Even the most reliable indicators cannot stand alone and must in parallel, be accompanied by information gained through additional means such as observations, expert opinions and human judgment.

In the remainder of this section we will expand the discussion of three types of oversight: vertical oversight of teaching quality, vertical oversight of the school and its principal and horizontal oversight of the school.

3.2 Vertical oversight of teaching quality⁵²

One of the most important questions with reference to an education system's success is how to identify teaching quality. More than any other factor in the education system, teachers have great influence on the educational process and its results and therefore almost any effort to improve the system must relate to the quality of teaching. Even the frequently heard (justified) demands to raise teachers' salaries as a condition that would improve the education system assume that we know how to identify good teachers and assign them appropriate tasks in terms of content-area, grade level, class size and students' ability level.⁵³

This question is one that primarily weighs on the school principal, who must decide whom to employ or reject as a teacher, whom to retain or dismiss, whom to promote or not, who will serve as a role model and who needs assistance. The question the present committee wishes to deal with is the operational indicators that can be used by principals to help them arrive at better decisions.⁵⁴

The difficulty in identifying good teaching comes up on the basic level, since this question necessarily rests on the preceding one: What are the objectives of education? Is the objective to prepare students to study at university or to educate them to dream and acquire the daring to follow their heart's desires? Or, perhaps the objective is to educate them to respect, cooperate with and be considerate of others and evince concern for those who are weaker? A teacher whose skills focus on test success may not be as skilled in instilling values. As we have already mentioned at the start of the chapter, if the "objectives of education" could be determined, this discussion would be much simpler. But, public consensus on the question of education's objectives does not exist and it is clearly not the committee's task to choose among the range of possible objectives.⁵⁵ Therefore, we have no choice but to continue the discussion, without there being a decision on this fundamental issue, in a way that will enable implementation of the various aims and conclusions.

In general, there are several approaches a principal can implement to try to assess a teacher's quality of instruction. One is observation: observe the teacher while teaching to evaluate the essence of educational practice, the process as it is expressed in the communication between the teacher and the class and between the students themselves, in the interest the teacher awakens in the class, in the way students participate in the

⁵² For a broader discussion of the topic, see the chapter on "Indicators for Quality of Teaching, Quality of Teachers and Quality of Schools" – p.67 in the full Hebrew report.

⁵³ An overall rise in salaries for teachers, without the possibility of distinguishing between better and worse teachers, would indeed increase the number of people interested in teaching, but would not enable assessing the most suitable ones. Therefore, it is not clear-cut that this step would bring about an improvement in the teaching force. On the importance of suitability, see: Erik Grönqvist and Jonas Vlachos, 2008, "One Size Fits All? The Effects of Teacher Cognitive and Non-cognitive Abilities on Student Achievement" IFN WP 779, Stockholm.

⁵⁴ The Ministry of Education's inspection arm, district management and stakeholders are all party to some of these decisions and they, too, are in need of some kind of supporting platform for the decisions they make or approve.

⁵⁵ Dr. Shimshon Shoshani, the Ministry of Education's present and past managing director, sees the lack of agreement about education's objectives as the cardinal problem of the education system in Israel (from a speech given at the 2009 Van Leer Conference on Education).

lesson, in the teacher's level of proficiency, both in the subject material and current pedagogical methods,⁵⁶ in effective use of class time and so on. The basic application of this approach is within the teaching accreditation framework, which includes student teaching in schools under an experienced teacher's supervision. Observation also continues during a teacher's initial years in the profession and is used again at a later stage in cases where there appears to be a problem in the teacher's performance. In the United States, the approach is used on a voluntary basis when veteran teachers seek advanced accreditation by the National Board for Professional Teaching Standards.⁵⁷ If the observation process is sufficiently structured, it can be translated into an indicator of quality, at different levels.

Nevertheless, this approach has clear limitations. Observing class events is a subjective experience to a great extent and the quality of the conclusions drawn depends on the quality of the observers – those watching and evaluating the teacher. It would be desirable, of course, to select as observers people who have already proven themselves in this capacity, but this returns us to our initial question: How do we identify them? Who tests the testers? And here there is another limitation: a system of uniform observations is impossible to implement on too large a scale because, by its nature, the number of experts who can capably recognize good instruction is small.

Observation findings have less of a serious validity problem at the extremes. It is not difficult to spot terrible teachers, those who cannot control the class, do not know how to prepare a lesson or constantly make mistakes related to the material they teach. Identifying excellent teachers is also relatively easy, those with charisma who hold the class in the palm of their hand. It is unclear, however, that the observation method enables distinction between various qualities among the large mass of teachers, those in the middle range rather than at the extremes. Occasionally, the call for a more structured observation process is heard, one that would reduce the degree of subjectivity and the variance between different observers.⁵⁸ However, this requirement also comes with a price tag - it leads to narrower, less open observation. Observation also has another great limitation: it does not say anything about how the teacher performs when not being observed.

Another approach to identifying good teachers is to ask students, parents and other teachers about a specific teacher's work. Students' and parents' opinions have particular importance. Students see what really happens in class and parents see how school affects their children. Although this is the case, this method is even more subjective than the first because the respondents generally have no systematic training and very little comparative experience so their answers cannot be based on either one of these assets. There is the possibility that their answers will be influenced by factors that distort the comparison, such as, the level of parental expectation or the teacher's external appearance.⁵⁹ Parents' and students' evaluations are certainly influenced by the extent their expectations correspond with those of the education system and the objectives the teacher seeks to advance in response to guidelines from the Ministry of Education and the school principal.

Even today, parents' opinions have an effect and principals certainly take them into account, at least in extreme cases. Parents who band together to complain about a particular teacher and do so in a reasoned and

⁵⁶ Darmon (2004) views observations as a less threatening method for assessing this information, as compared to a regular test. (Hebrew)

⁵⁷ See the organization's website: <http://www.nbpts.org/> for a detailed description of the accreditation process. The committee of the US National Research Council found the NBPTS's method is good for identifying teachers whose students achieve greater advancement but it is unclear whether the authorization process leads to an improvement in teaching. See: Milton D. Hake, Judith Anderson Koenig, and Stuart W. Elliott, Editors, *Assessing Accomplished Teaching: Advanced-Level Certification Programs*. Washington, DC: National Research Council, 2008.

Avital Darmon ("Teachers – Licensing and professional advancement," 2004, (Hebrew) background paper for the Dovrat Commission) suggests instituting nationwide licensing exams, based on the NBPTS approach and on France's licensing exams for new teachers.

⁵⁸ See Pianta, et al.'s article: Robert C. Pianta, Jay Belsky, Renate Houts, Fred Morrison, "Opportunities to Learn in America's Elementary Classrooms," *Science*, vol. 315, 30 March 2007, pp. 1795-96, which briefly describes a structured method for evaluating class events for the purpose of identifying "learning opportunities," as well as the home page for this evaluation method: <http://www.virginia.edu/vpr/CASTL/?q=node/9>

⁵⁹ Many studies show that students' evaluations are very much influenced by the teacher's external appearance, even at the university level. At younger ages appearance is less of a factor.

logical fashion, can lead to a teacher being transferred to another school and, in extreme cases, to getting the teacher dismissed from the education system. Even in the opposite case, when the subject of parents' joint action is a teacher who is held in high esteem and praised, their opinions carry weight. The question is whether and how this process can be standardized; this is a complex question in need of study. First, it is unclear how irrelevant considerations are factored out of the equation and second, standardizing the process to be part of routine oversight of teachers' functioning changes the balance of power between teachers, on the one hand, and parents and children, on the other, and weakens the teachers' power. This can be perceived as a great drawback, especially to those who view teachers' decreasing authority as one of the central structural problems of the education system.

A third approach is evaluating teachers according to the results their students achieve. In principle, this approach can be applied to all the objectives of education, including social aims such as helping the community, good habits such as abstaining from smoking or drinking or, meaningful military service (in the relevant populations). The major methodological and practical work in this area, however, concentrates on scholastic achievement, as will be discussed below.

The first question that arises in this connection is whether to relate to the level of students' results or to a change in results, that is, advancement (or regression) in their studies. Measuring the level of results, as is done with the rate of success on the matriculation exam, is much simpler and structured. This is the basic approach used by the NCLB program. The great disadvantage inherent in this approach is that it is likely to create an incentive for teachers to avoid or abstain from teaching children who are poor students. A partial solution is to limit comparisons only to similar children as much as it is possible to identify them, meaning to compare children only to others of the same gender, religion and nationality, or with similar socio-economic backgrounds, and so on. This, however, is only a partial solution.

Measuring a student's progress resolves this problem in a more fundamental way. This approach is called *Value-Added Measurement* (VAM) and is thought to be the "last word in accountability."⁶⁰ The principle is simple: a student is tested at the beginning and at the end of a certain period; any change is attributed to the teacher, after statistically factoring out variables not under the teacher's control, such as the school's environmental conditions.⁶¹ This approach was successfully implemented in many studies and the general conclusion is that there are significant differences in teachers' abilities to advance their students' scholastic achievements, but it is not known how to identify these differences using external identifying markers, such as seniority or formal training.⁶² It is then possible to identify a good teacher based on students' past success but this is a long-term endeavor and, even though the result is statistically significant, identifying high teaching ability in individual teachers is characterized by wide variance, and many observations would be required in order to map the variances. This is the main reason this approach is not implemented as an operational oversight tool for teachers' quality of instruction (it is used only in research): the variances are too great for individual operational assessment to be based upon such an approach.⁶³

Another limitation of this approach is that it requires the definition of uniform standards for every class (in subjects on which they are tested) and, therefore, it is not possible to implement it in all fields. In addition, there is a great degree of arbitrariness in determining an achievement yardstick for each subject area and in averaging the progress rate of many students. Moreover, the VAM approach only picks up influences on

⁶⁰ For a general review, see Henry Braun's essay: Braun, Henry (2005), *Using Student Progress to Evaluate Teaching: A Primer on Value-added Models*. Princeton, NJ: Educational Testing Service; see also, Analia Schlosser's background paper and a range of reviews and studies on the topic at: <http://www.caldercenter.org/publications.cfm> (Hebrew)

⁶¹ For a comprehensive discussion on the range of possible statistical methods, see: Petra Todd and Kenneth Wolpin, 2007, "The Production of Cognitive Ability in Children: Home, School and Racial Test Score Gaps," *Journal of Human Capital*, 1: 91-136.

⁶² See for example, Hanushek, et al's comprehensive study based on data from Texas: Steven G. Rivkin, Eric A. Hanushek, and John F. Kain, "Teachers, Schools, and Academic Achievement," *Econometrica* 73(2), March 2005, pp. 417-458.

⁶³ See, in particular, Jesse Rothstein's critique on implementing the VAM approach for remunerating teachers: Jesse Rothstein, 2008, "Teacher quality in educational production: Tracking, decay, and student achievement," NBER Working Paper 14442. The situation with respect to schools is better and we will relate to that below.

learning achievements during the ongoing year and does not identify long-term effects (such as a teacher who imparts a basic skill, and whose contribution is revealed only after many years and is therefore attributed to other teachers) or the qualities of a teacher whose advantages come to the fore in non-scholastic achievements. Lastly, applying this method in Israel will require administering national tests (such as the EGEMS) with full centralized grading at each school, each year, for consecutive grades. This process comes at great economic cost and the multiplicity of tests will also have a significant impact – many will say a damaging impact – on the learning process in class. That said, the great variance in the results is enough to disqualify this approach for operational application at this stage.

34) Recommendation: Making indicators of teaching quality available to assist school principals in assessing teachers' quality of teaching requires a multi-faceted approach that includes structured observation during lessons, student and parent feedback, peer (teacher) evaluations and the comparisons between achievements of similar students. The VAM approach is not yet ripe for application at the level of the individual teacher.

3.3 Vertical oversight of school quality

Operational indicators that can help the Ministry of Education and stakeholders in evaluating the schools under their authority, as well as evaluating the principals that head the schools, are somewhat similar to those available to the principal for evaluating teaching quality at the school: inspectors and oversight teams come to the school, conduct observations in classes and in the entire school, interview the teaching staff, other school personnel, parents and students and distribute questionnaires for them to complete.

In addition, there are indicators that characterize the school from several perspectives, including its student population (age and grade ranges, socio-economic status, learning disabilities, special needs and so on), teaching staff and other school personnel (numbers, training, experience, type and scope of work), budget, distribution of class size, physical conditions, the library, level of computing and media equipment, curricula offered and so on. All these characterize the school and give achievement the proper context within which systematic comparisons between schools are enabled.

The simpler approach to achievement is comparison of results on tests, such as the EGEMS and matriculation exams, and comparison of data in other dimensions, such as voluntary activities or sports, between schools similar in student population and school type. The EGEMS was planned for this purpose: to characterize a school's achievements, describe its climate and compare it to similar schools. The National Authority for Measurement and Evaluation in Education (RAMA) routinely issues reports of this type for the Ministry of Education's exclusive, internal use. The public and parents have no access to this report.

As was already noted in the discussion on teaching quality, a more progressive approach to evaluating how schools affect student achievement is the VAM tool for schools. As described in the previous section, this approach is structured around achievement tests taken by students at the start and at the end of a certain period, with a change in the results attributed to the school, after the effect of uncontrolled variables is removed. It was noted above that there is too much variance for the tool to be integrated for use in operational oversight of individual teachers. However, when applied to schools, there is less variance and the accepted professional opinion is that for operational oversight of schools it can be integrated as an indicator of added value, provided it is part of an overall integrated evaluation system. This type of system includes an estimated added value side, indicators of the school's level of achievement as compared to other similar schools and a qualitative assessment on the basis of observations conducted by a team of inspectors.

Implementation of this approach in Israel must rely on the EGEMS tests and would require, as already noted, substantial expansion of test coverage: tests from all schools would have to be centrally graded – offsite,

annually, with tests administered to consecutive grades. These steps would involve significant expense and affect the learning process. Therefore, the committee recommends testing the approach on a trial basis, with a limited sample of schools, at this stage.

35) Recommendation: Vertical oversight of schools must integrate a variety of assessment approaches, including school visits, parent and student feedback and analysis of schools' nationwide tests results, in comparison to other, similar schools.

36) Recommendation: In Israel, an infrastructure for use of the Value-Added Measurement tool does not yet exist and it is preferable to begin testing this approach on a limited sample of schools. The trial should rely on the experience accumulated in the US, where schools have been evaluated using this approach and which has shown that it must be supplemented by class observations by experts and achievement level measurement.

There are various ways to implement the VAM approach in schools. A simple, non-parametric method works in basically the following way. Suppose we focus on three pupils in the second grade at a particular school in 2002. On the EGEMS test of that year, the first pupil ranked in the 61st percentile among all 2nd grade pupils in the country (tested during that year); the second ranked in the 38th percentile and the third in the 17th percentile. In 2002, that specific class had lower than average achievements. Now, suppose that in 2005 those same children are in 5th grade at the same school (in order for the method to work, the school population must remain stable). On the tests administered in 2009, the first child ranked in the 42nd percentile among all the children compared to those children who in 2002 ranked in the 61st percentile; the second child ranked in the 74th percentile compared to children who ranked in the 38th percentile in 2002 and the third child ranked in the 58th percentile compared to all children ranking in the 17th percentile in 2002. The average ranking of children in their school compared to children with similar achievements in 2nd grade is 58 (the average of 42, 74 and 58), meaning that their school achieved above average results in literacy during those years and for those grade levels.

3.4 Horizontal school oversight

The same indicators used for vertical school oversight can be used for horizontal oversight; they must simply be directed to other parents and to the wider public as they have an interest in how the school functions. An important application of information from this type of indicator is its use as an aid for selecting a school for children, or for the transition from elementary to middle school, where such choice is available. Another application uses the indicator as an oversight tool for evaluating the school's performance so that parent committees can use it to exert influence. Although horizontal oversight makes use of basically the same data as vertical oversight of schools, the differences are in the target group and the use that is made of the indicators; this requires important changes in the way results are distributed and presented. Reports to parents must be more accessible and user-friendly, as well as easy to understand.

Beyond this, a report intended for parents should describe the school in a manner that will enable them to evaluate its level of suitability for meeting their own children's needs.⁶⁴ It is important that the indicators of school quality to which parents have access do not lead them to rank schools along a one-dimensional hierarchy, called "league tables," as often happens when, for example, schools are ranked using the percentage of students eligible for matriculation certificates. The indicators should present parents and the public with a

⁶⁴ Indicators intended to provide the horizontal oversight of the school principal are more linear: they assess the principal's level of quality, whether good or bad. The indicators meant for parents also include the dimension of quality but their purpose is different: it is to help them in finding a good fit between the needs of the child and what a school can offer.

wealth of information that emphasizes the uniqueness of each school and clearly indicates the school's target audience and the kinds of students to whom the school's offerings are suited. In Israel today, ranking schools hierarchically is avoided, owing to a Ministry of Education decision not to publicize individual school's EGEMS test results and matriculation exam results. However, it appears that the policy of preventing data from being publicized will not continue for long. Presenting these data within the wider context of many other indicators which emphasize the particular advantages of each school, not only its achievement results, will water down the effect of one-dimensional league tables based on matriculation and EGEMS test results – which the newspapers will certainly be quick to publish (as is customary in other countries).⁶⁵ In the United States, big cities such as New York and Chicago have developed internet-based information systems for transmitting a wealth of information about schools to the public at large; it is advisable to learn from these efforts.⁶⁶

Schools' online profiles include the school building, the yard, playgrounds, laboratories, library, computing facilities and other aspects of the physical conditions; the curricula and, in particular, special programs which distinguish it from other schools; the student population broken down into various cross-sections; school staff and positions; social and community activities and scholastic achievement on national tests as compared to other schools similar in population and specialties. A school profile of this nature is part of a general system that routes students to different schools.

37) Recommendation: Indicators for building school profiles for public use, particularly for parents of students, must be accessible and user-friendly even for those with a limited professional background. Profiles should provide a wealth of information about schools' physical conditions, human components, curricula offered, social and communal activities, school climate and academic achievements as compared to other similar schools. The objective of school profiles is not to rank schools but rather to give parents and students a tool they can use to select a suitable school.

3.5 Reports based on region and sector, etc.

Although the Israeli education system is nationwide and managed by a government ministry, it is in many respects decentralized, a trend that is on the rise. Decentralization is found mainly with reference to cultural and religious aspects: along the lines of language (Hebrew or Arabic) and religious orientation (mainly independent education, Torah-based education, state-religious and state-secular education). Aside from these, decentralization is growing along geographical lines - and this is one of the Dovrat Commission's central recommendations – and along stakeholder lines, especially at the secondary-school level. This leads to a need to create reports along the lines of the national or school reports for these cross-sections as well, both for purposes of external oversight and for internal management so that each and every organization will be able to verify that it is achieving its objectives.

38) Recommendation: Reports along the lines of the national or school reports should also be created for sub-cross-sections dealing with type of oversight (such as state-non-religious or state-religious) and language (Hebrew and Arabic), and for the geographic cross-sections with respect to district and local authority, both for external oversight purposes and for internal management, so that each and every organization can take account of where it stands with respect to its goals.

⁶⁵ The danger of league tables is that they may increase segregation between students from different backgrounds and increase the distance and alienation between different socio-economic groups. Building a detail-rich school profile that emphasizes the school's suitability in meeting student needs can attract students with similar needs but different socio-economic backgrounds and can even set off an opposite effect, of attracting a variety of socio-economic groups.

⁶⁶ In New York: <http://schools.nyc.gov/default.htm>

In Chicago: http://www.cps.edu/Schools/Find_a_school/Pages/Findaschool.aspx

3.6 To conclude: two organizational comments for the future

The committee barely dealt with the organizational aspects of education indicators in Israel. The topic is very complex and the committee chose to direct its limited resources to other aspects. We will confine ourselves here to two general comments the committee views as relevant for implementing this report's recommendations.

First, there is not enough coordination between the main bodies involved in planning, constructing and distributing indicators for education in Israel. As a result, definitions are not uniform and, thus, information from various databases cannot be combined. The multiple sources for indicators are a fact of life and apparently cannot be changed. Each one of the central bodies in this field – the Ministry of Education, the National Authority for Measurement and Evaluation in Education and the Central Bureau of Statistics – has a distinct identity and each one of them has a legal responsibility obligating them to collect, process and disseminate data to various target audiences. Realistically, it is doubtful whether it is possible to arrive at a situation where there would be just one source for indicators for education. What is therefore required is an independent coordinating body to integrate and synchronize data from various sources: first and foremost, from the three main bodies but also between them and external sources, such as the Israel Police, welfare services, the National Insurance Institute, institutions of higher learning that conduct a range of research in the area of education and other institutions external to the education system that collect, process and publicize supplemental information.

Second, construction of reliable and useful indicators depends upon a thorough understanding of the multiplicity of educational objectives, of learning and teaching processes, of the social structure and the economy served by the education system, and of the organizational structure of the education system itself. Thus, there are tight reciprocal relations between basic research (conceptual, empirical and experimental) on these topics and the construction of education indicators. While the organizations active in the field track relevant research in the international arena and also conduct and commission research here in Israel (this is the main activity of the three major bodies), their resources are limited, their objectives different and, in any case, their activities are not coordinated.

Were a coordinating body for education indicators to be established, it would be advisable to grant it the authority and the resources to continually monitor research on education indicators around the globe and to initiate local research on the topic: basic research on the reciprocal relationship between various components of the educational process that represent the infrastructure for the construction of indicators, and applied research directed toward upgrading existing indicators and creating new ones, including operational aspects of the system of indicators.

39) Recommendation: Establish an independent body or designate an existing independent body to promote compatibility among the different education indicators publicized by the Ministry of Education, the National Authority for Measurement and Evaluation in Education and the Central Bureau of Statistics and integrate the databases from different sources. This organization should have the resources at its disposal to track up-to-date research in the field and initiate new, basic and feasible studies on topics relevant to the system of indicators for education in Israel. This body would periodically reexamine and revise the system of education indicators in Israel.

Bibliography*

(The sources in Hebrew follow the English)

- Achenbach, T. M. (1991). *Manual for the Child Behavior Checklist 4–18 and 1991 profile*. Burlington: University of Vermont, Department of Psychiatry.
- Alexander, L., Ravitch, D., & Elliott, E. Y. (1991). *Education counts*. US Department of Education National Center for Educational Statistics.
- Anderson, C. S. (1982). The search for school climate: A review of the research. *Review of Educational Research*, 52, 368-420.
- Anderson, P. A., & Guerrero, L. K. (1998). Principles of communication and emotion in social interactions. In P. A. Anderson & L. K. Guerrero (Eds.), *Handbook of communication and emotion* (pp. 49-96). New York: Academic Press.
- Atkinson, J. W. (1964). *An introduction to motivation*. Princeton, NJ: Van Nostrand.
- Bandura, A. (1997). *Self-efficacy: The exercise of self-control*. New York: W. H. Freeman.
- Bender-Sebling, P., Allensworth, E., Bryk, A. S., Easto, J. Q., & Luppescu, S. (2006). *The essential support for school improvement*. Chicago, Illinois: Consortium on Chicago School Research at the University of Chicago.
- Blank, R. K. (1993). Developing a system of education indicators: Selecting, implementing, and reporting indicators. *Educational Evaluation and Policy Analysis*, 15, 65-80.
- Braun, H. (2005). *Using student progress to evaluate teaching: A primer on value-added models*. Princeton, NJ: Educational Testing Service.
- Brookover, W. B., & Erickson, E. L. (1975). *Sociology of education*. Homewood: Dorsey Press.
- Brousseau, G. (1997). *Theory of didactical situations in mathematics*. Berlin: Springer.
- Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in evaluating complex interventions in classroom settings. *The Journal of the Learning Sciences*, 2, 141-178.
- Bryk, A. S., & Hermanson, K. L. (1993). Educational indicator systems: Observations on their structure, interpretation, and use. *Review of Research in Education*, 19, 451-484.
- Bryk, A. S., & Schneider, B. (2003). Trust in schools: A core resource for school reform. *Educational Leadership*, 60, 40-44.
- Burstein, L., McDonnell, M. L., Van Winkle, J., Ormseth, T., Mirocha, J., & Guiton, G. (1995). *Validating national curriculum indicators*. Retrieved September 6th, 2009, from http://www.rand.org/pubs/monograph_reports/MR658/
- California Healthy Kids Survey. Retrieved September 6th, 2009, from <http://www.wested.org/cs/we/view/rstudy/9>
- Center for Evaluation and Monitoring. Retrieved September 6th, 2009, from <http://www.cemcentre.org/RenderPage.asp?LinkID=10010000>
- Choi, K. H., Raley, R. K., Muller, C., & Riegle-Crumb, C. (2008). Class Composition: Socioeconomic Characteristics of Course mates and College Enrollment. *Social Science Quarterly*, 89(4), 846-866.
- Clarke, D. J., Keitel, C., & Shimizu, Y. (Eds.) (2006). *Mathematics classrooms in twelve countries: The insider's perspective*. Rotterdam: Sense Publishers.
- Clotfelter, C. T., Ladd H. F., & Vigdor, J. L. (2007). *Teacher credentials and student achievement in high school: A cross-subject analysis with student fixed effect*. Retrieved September 6th, 2009, from http://www.caldercenter.org/PDF/1001104_Teacher_Credentials_HighSchool.pdf

* Reflects sources used in the complete report

- Corno, L. (1986). The metacognitive control components of self-regulated learning. *Contemporary Educational Psychology, 11*, 333-346.
- Corno, L., Cronbach, L., Kupermintz, H., Lohman, D., Mandinach, E., Porteus, A., et al. (2002). *Remaking the concept of aptitude: Extending the legacy of Richard E. Snow*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Costa, P. T., Jr., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences, 135*, 653-65.
- Diener, E. (2000). Subjective well being: The science of happiness and a proposal for a national index. *American Psychologist, 55*, 34-43.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*, 1040-1048.
- Elliot, A. J., & Thrash, T. M. (2001). Achievement goals and the hierarchical model of achievement motivation. *Educational Psychology Review, 13*, 139-156.
- Esposito, C. (1999). Learning in urban blight: School climate and its effect on the school performance of urban, minority, low-income children. *School Psychology Review, 28*, 365- 377.
- Eurostat (2000). *Key data on education in Europe 1999-2000*. Luxembourg: European Commission.
- Eurydice (2000/01). *Basic indicators on the incorporation of ICT into European education systems – facts and figures*. Brussels: Eurydice European Unit.
- Fantuzzo, J., Bulotsky, R., McDermott, P., Mosca, S., & Lutz, M. N. (2003). A multivariate analysis of emotional and behavioral adjustment and preschool educational outcomes. *School Psychology Review, 32*, 185-203.
- Findley, M. J., & Cooper, H. M. (1983). Locus of control and academic achievement: A literature review. *Journal of Personality and Social Psychology, 44*, 419-427.
- Fine, S. E., Izard, C. E., Mostow, A. J., Trentacosta, C. J., & Ackerman, B. P. (2003). First grade emotion knowledge as a predictor of fifth grade self-reported internalizing behaviors in children from economically disadvantaged families. *Development and Psychopathology, 15*, 331-342.
- Flecknoe, M. (2005). The changes that count in securing school improvement. *School Effectiveness and School Improvement, 16*, 425-443.
- Fuller, B., & Clarke, P. (1994). Raising school effects while ignoring culture? Local conditions and the influence of classroom tools, rules and pedagogy. *Review of Educational Research, 64*, 119-157.
- Furtak, E. M., Hardy, I., Beinbrech, T., Shavelson, R. J., & Shemwell, J. T. (2008) *A framework of analyzing reasoning in science classroom discourse*. Paper presented at the Annual Meeting of the American Educational Research Association, New York.
- Garcia, T., & Pintrich, P. (1994). Regulating motivation and cognition in the classroom: The role of self-schemas and self-regulatory strategies. In D. Schunk, & B. Zimmerman (Eds.), *Self-regulated learning: Issues and applications* (pp. 127-153). Hillsdale, NJ: Erlbaum.
- Gardner, D. (1983). *A nation at risk: The imperative for educational reform*. U.S. Department of Education, The National Commission on Excellence in Education. Washington, DC: U.S. Government Printing Office.
- Gilboa, Y. (2004). Kibbutz education: Implications for nurturing children from low-income families. *Israel Economic Review, 2*, 107-123.
- Goddard, R., O'Brien, P., & Goddard, M. (2006). Work environment predictors of beginning teacher burnout. *British Educational Research Journal, 32*, 857-874.
- Greenberg, M. T., Weissberg, R. P., O'Brien, M. U., Zins, J. E., Fredericks, L., Resnik, H., et al. (2003). Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning. *American Psychologist, 58*, 466-474.
- Grönqvist, E., & Vlachos, J. (2008). *One size fits all? The effects of teacher cognitive and non-cognitive abilities on student achievement*. IFN Working Paper 779, Stockholm. Retrieved September 6th, 2009, from <http://www.ifau.se/upload/pdf/se/2008/wp08-25.pdf>

- Hakel, M. D., Anderson Koenig, J., & Elliott, S. W. (Eds.) (2008). *Assessing accomplished teaching: Advanced-level certification programs*. Washington, DC: National Research Council.
- Halpin, A. W., & Croft, D. B. (1963). *The organizational climate of schools*. Chicago: Midwest Administration Center of the University of Chicago.
- Hanushek, E. A., Kain, J. F., O'Brien, D. M., & Rivkin, S. G. (2005). *The market for teacher quality* (NBER Working Paper 11154). Cambridge, Mass.: National Bureau of Economic Research. Retrieved June 15th, 2007 from <http://www.nber.org/papers/w11154>.
- Hargreavs, A. (1994). *Changing teaching times*. New York: Teachers College Press.
- Harkness, A. R., & Lilienfeld, S. O. (1997). Individual differences science for treatment planning: Personality traits. *Psychological Assessment, 9*, 349-360.
- Haynes, N. M., Emmons, C., & Comer, J. P. (1993). *Elementary and middle school climate survey*. New Haven, CT: Yale University Child Study Center.
- Hoy, W. K., Smith, P. A., & Sweetland, S. R. (2002). The development of the organizational climate index for high schools: Its measure and relationship to faculty trust. *The High School Journal, 86*, 38-49.
- Jencks, C., Smith, M., Acland, H., Bane, M., Cohen, D., Gintis, I., et al. (1972). *Inequality: A reassessment of the effect of family and schooling in America*. New York: Basic Schools.
- Jensen, A. (1998). *The g factor: The science of mental ability*. Westport, CT: Praeger.
- Johnson, W. L., & Johnson, A. M. (1997). Assessing the validity of scores on the Charles F. Kettering Scale for the junior high school. *Educational & Psychological Measurement, 57*, 858-869.
- Johnson, W. L., & Johnson, M. (1993). Validity of the quality of school life scale: A primary and second-order factor analysis. *Educational & Psychological Measurement, 53*, 145-153.
- Kanfer, R., Ackerman, P. L., & Heggestad, E. D. (1996). Motivational skills and self-regulation for learning: A trait perspective. *Learning and Individual Differences, 3*, 185-209.
- Karatzias, A., Power, K. G., & Swanson, V. (2001). Quality of school life: Development and preliminary standardisation of an instrument based on performance indicators in Scottish secondary schools. *School Effectiveness and School Improvement, 12*, 265-284.
- Keefe, J. W., & Kelley, E. A. (1990). Comprehensive assessment and school improvement. *NASSP Bulletin, 74*, 54-63.
- Kyllonen, P. C., & Lee, S. (2005). Assessing problem solving in context. In O. Wilhelm, & R. W. Engle (Eds.), *Handbook of understanding and measuring intelligence* (pp. 11 – 25). Thousand Oaks, CA: Sage.
- Ladd, H. F., & Walsh, R. P. (2002). Implementing value-added measures of school effectiveness: Getting the incentives right. *Economics of Education Review, 21*, 1-17.
- Larsen, R. J., & Diener, E. (1992). Promises and problems with the circumplex model of emotion. In M. S. Clark (Ed.), *Review of personality and social psychology: Emotion* (Vol. 13, pp. 25-59). Newbury Park: Sage.
- Levacic, R., Malmberg, L., Steele, F., & Smees, R. (2003). *The relationship between school climate and head teacher leadership, and pupil attainment: Evidence from a sample of English secondary schools*. Paper presented at the British Educational Research Association Annual Conference.
- Little, T. D., Oettingen, G., Stetsenko, A., & Baltes, P. B. (1995). Children's action-control beliefs about school performance: How do American children compare with German and Russian children? *Journal of Personality & Social Psychology, 69*, 686-700.
- Livesley, W. J. (2001). A framework for an integrated approach to treatment. In W. J. Livesley (Ed.), *Handbook of personality disorders: Theory, research, and treatment* (pp. 570–600). New York: Guilford.
- Lopes, P. N., Salovey, P., & Straus, R. (2003). Emotional intelligence, personality, and the perceived quality of social relationships. *Personality and Individual Differences, 3*, 641-659.
- Marsh, H. W. (2005). *Self-concept theory, measurement and research into practice: The role of self-concept in educational psychology*. 26th Vernon-Wall Lecture. The British Psychological Society.

- Matthews, G., Zeidner, M., & Roberts, R. (2006). Models of personality and affect for education: A review and synthesis. In P. A. Alexander, & P. H. Winne (Eds.), *Handbook of educational psychology* (pp. 163-186). Mahwah, NJ: Lawrence Erlbaum.
- Mayer, J. D., Salovey, P., & Caruso, D. R. (2002). *Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) User's Manual*. Toronto, Canada: MHS Publishers.
- Mayer, P. D., Mullens, E. J., Moore, T. M., & Ralph, J. (2000). *Monitoring school quality: An indicators report*. U.S. Department of Education, Institute of Education Sciences – National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- McEvoy, A., & Welker, R. (2000). Antisocial behavior, academic failure, and school climate: A critical review. *Journal of Emotional and Behavioral Disorders*, 8, 130-140.
- Miller, C. D., Malley, B. L., & Owen, E. (2007). *Comparative indicators of education in the United States and other G-8 countries: 2006*. U.S. Department of Education, Institute of Education Sciences – National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- Morrison, G. M., Peterson, R., O'Farrell, F., & Redding, M. (2004). Using office referral records in school violence research: Possibilities and limitations. *Journal of School Violence*, 3, 89-108.
- National Academy for Education. Retrieved September 6th, 2009, from http://www.naeducation.org/NAEd_White_Papers_Project.html#TopOfPage
- National Board for Professional Teaching Standards. Retrieved September 6th, 2009 from <http://www.nbpts.org/>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw Hill.
- Nuttall, D. L. (1990). The functions and limitations of international educational indicators. *International Journal of Educational Research*, 14, 327-333.
- Oakes, J. (1989). What educational indicators? The case for assessing the school context. *Educational Evaluation and Policy Analysis*, 11, 181-199.
- OECD (2008). *Education at a glance – OECD indicators*. Retrieved September 6th, 2009, from <http://www.oecd.org/dataoecd/23/46/41284038.pdf>
- Perkrun, R., Goetz, T., Titz, W. & Perry, R. P. (2002). *A social cognitive, control-value theory of achievement emotions: Social antecedents and achievement effects of students' domain-related emotions*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Pianta, R. C., Belsky, J., Houts, R., & Morrison, F. (2007). Opportunities to learn in America's elementary classrooms. *Science*, 315, 1795-96.
- Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82, 33-40.
- Pintrich, P. R., & Schunk, D. (1996). *Motivation in education: Theory, research, and application*. Columbus, OH: Merrill/Prentice Hall.
- Porter, C. A. (1991). Creating a system of school process indicator. *Educational evaluation and Policy Analysis*, 13, 13-29.
- Power, C. (1990). Higher education indicators: An exercise in interpretation. *International Journal of Educational Research*, 14, 353-361.
- Praekel, F., Zeidner, M., Goetz, T., & Schleyer, E. (2008). Female big fish swimming against the tide: The BFLPE and gender ratio in special gifted classes. *Contemporary Educational Psychology*, 33, 78-96.
- Reynolds, D., Teddlie, C., Creemers, B., Scheerens, J., & Townsend, T. (2000). An introduction to school effectiveness research. In C. Teddlie, & D. Reynolds (Eds.), *The international handbook of school effectiveness research* (pp. 3-25). London ; New York : Falmer Press.

- Rivers, S. E., Brackett, M. A., Reyes, M., & Salovey, P. (2008). *Emotion skills in early adolescence: Relationships to academic and social functioning*. Paper presented at the meeting of the American Educational Research Association, New York, NY.
- Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica*, *73*, 417-458.
- Robbins, S. B., Lauver, K., Le-Huy, D. D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, *130*, 261-288.
- Rothstein, J. (2008). Teacher quality in educational production: Tracking, decay, and student achievement. NBER Working Paper 14442.
- Ruban, L., McCoach, D. B., & Reis, S. M. (2002). Gender invariance in the impact of pre-college scholastic factors and self-regulated learning variables on the academic attainment of undergraduate students. Paper presented at the Annual Convention of the American Research Association, New Orleans, Louisiana.
- Sanders, W. L., & Rivers, J. C. (1996). *Cumulative and residual effects of teachers on future student academic achievement*. Knoxville: University of Tennessee Value-Added Research and Assessment Center.
- Salganik, H. L., Phelps, P. R., Bianchi, L., Nohara, D., & Smith, M. T. (1993). *Education in states and nations: Indicators comparing U.S. states with the OECD countries in 1988*. U.S. Department of Education, Institute of Education Sciences – National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- Sammons, P., Hillman, J., & Mortimore, P. (1995). *Key characteristics of effective schools: A review of school effectiveness research*. London: OFSTED.
- Schagen, I. & Hutchison, D. (2003). Adding value in educational research – the marriage of data and analytical power. *British Educational Research Journal*, *29*(5), 749-765.
- Scheerens, J. (1990). School effectiveness research and the development of process indicators of school functioning. *School Effectiveness and School Improvement*, *1*, 61-80.
- Scheerens, J. (1991). Process indicators of school functioning: A selection based on the research literature on school effectiveness. *Studies in Educational Evaluation*, *17*, 371-403.
- Scheerens, J. (2000). Improving school effectiveness. *Fundamentals of Educational Planning*, *68*. Paris: UNESCO.
- Scheerens, J. (2001). Monitoring school effectiveness in developing countries. *School Effectiveness and School Improvement*, *12*, 359-384.
- Schmitt, N., Sacco, J. M., Ramey, S., Ramey, C., & Chan, D. (1999). Parental employment, school climate, and children's academic and social development. *Journal of Applied Psychology*, *84*, 737- 753.
- Schoen, L. T., & Teddlie, C. (2008). A new model of school culture: A response to a call for conceptual clarity. *School Effectiveness and School Improvement*, *19*, 129-153.
- Schuetz, G., Ursprung, H. W., & Woessman, L. (2005). *Education policy and equality of opportunity*. IZA Discussion Paper No. 1906, Bonn.
- Schunk, D. H., & Zimmerman, B. J. (Eds.) (1994). *Self-regulation of learning and performance: Issues and Educational implications*. New York: Guilford.
- Schutz, P. A., & Pekrun, R. (Eds.) (2007). *Emotion in Education*. San Diego, CA: Elsevier.
- Schwean, V. L., Mykota, D., Robert, L., & Saklofske, D. H. (1999). Determinants of psychosocial disorders in cultural minority children. In V.L. Schwean, & D. H. Saklofske (Eds.), *Handbook of psychosocial characteristics of exceptional children*. New York: Kluwer/Plenum.
- Selden, R. W. (1990). Developing educational indicators: A state-national perspective. *International Journal of Educational Research*, *14*, 383-393.
- Shavelson, R., McDonnell, L., Oakes, J., Carey, N. & Picus, L. (Eds.) (1987). *A comprehensive model of the precollege educational system. Indicator systems for monitoring mathematics and science education*. Santa Monica, CA: The Rand Corporation.

- Skevington, S. (2003). *Creating an environment for emotional and social well-being: An important responsibility of health-promoting and child-friendly school*. Information Series on School Health, Document 10. Geneva: WHO.
- Snow, R. E. (1994). Abilities in academic tasks. In R. J. Sternberg, & R. K. Wagner (Eds.). *Mind in context: Interactionist perspectives on human intelligence* (pp. 3-37). Cambridge, MA: Cambridge University Press.
- Spielberger, C. D. (1980). *Test Anxiety Inventory: Preliminary Professional Manual*. Palo Alto, CA: Consulting Psychologists Press.
- Stigler, J. W., & Hiebert, J. (1999). *The teaching gap*. New York: The Free Press.
- Teddlie, C., & Stringfield, S. (1993). *Schools do make a difference: Lessons learned from a 10- year study of school effects*. New York: Teachers College Press.
- Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In A. H. Tuma & J. D. Maser (Eds). *Anxiety and the anxiety disorders*. (pp. 681-706). Hillsdale, NJ, England: Lawrence Erlbaum Associates.
- Todd, P., & Wolpin, K. (2007). The production of cognitive ability in children: Home, school and racial test score gaps. *Journal of Human Capital, 1*, 91-136.
- Van Houtte (2005). Climate or culture? A plea for conceptual clarity in school effectiveness research. *School Effectiveness and School Improvement, 16*(1), 71-89.
- Ventura, M., Zeidner, M., & Roberts, R. D. (in press). Assessment in schools—Affective domain. In B. McGaw, E. Baker, & P. P. Peterson (Eds.), *International Encyclopaedia of Education* (3rd Edition). Oxford: Elsevier.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scale. *Journal of Personality and Social Psychology, 54*, 1063-1070.
- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer Verlag.
- Weiner, B. (2001). Interpersonal and interpersonal theories of motivation from an attribution perspective. In S. Farideh, & C. Chi-yue (Eds.), *Student motivation: The culture and context of learning. Plenum human exceptionality* (pp. 17-30). Dordrecht, Netherlands: Kluwer Academic Publisher.
- Wigfield, A., Battle, A., Keller, L. B., & Eccles, J. S. (2002). Sex differences in motivation, self-concept, career aspiration, and career choice: Implications for cognitive development. In A. McGillicuddy-De Lisi, & R. De Lisi (Eds.), *Biology, society, and behavior: The development of sex differences in cognition* (pp. 93-124). Westport, CT: Ablex.
- Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*, 265-310.
- Woessmann, L. (2004). *How equal are educational opportunities? Family background and student achievement in Europe and the United States*. Bonn: IZA Discussion Paper 1284.
- Yackel, E., & Cobb, P. (1996). Sociomathematical norms, argumentation, and autonomy in mathematics. *Journal for Research in Mathematics Education, 27*, 458-477.
- Zeidner, M. (1995). A Hebrew adaptation of the *Generalized Self-Efficacy Scale*. Laboratory for Personality and Emotions. University of Haifa.
- Zeidner, M. (1998). *Test anxiety: The state of the art*. New York: Plenum Press.
- Zeidner, M. (2009). Personality in educational and psychology. In P. Corr & G. Matthews (Eds.), *Cambridge handbook of personality*. Cambridge: Cambridge University Press.
- Zeidner, M., Nevo, B., & Lipschitz, H. (1988). *The Hebrew Version of the Test Anxiety Inventory*. Haifa: University of Haifa.
- Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*, 82-91.

- אבר-עסבה, ח' (2004). הקמת מינהל עצמאי ואוטונומי למערכת החינוך הערבית בישראל. בתוך ד' גולן-עגנון (עורכת), אי-שוויון בחינוך. תל-אביב: הוצאת בבל.
- איילון, ח' (2000). זכות הבחירה ואי-השוויון בחינוך: היבטים חברתיים של הרפורמה במבנה הלימודים בחטיבה העליונה. בתוך ח' הרצוג (עורכת), חברה במראה, לזכרו של יונתן שפירא. תל-אביב: הוצאת רמות.
- ארהרד, ר' (2000). ערכה לאבחון מאפיינים של אלימות בית-ספרית. ירושלים: משרד החינוך התרבות והספורט, השירות הפסיכולוגי-יעוצי.
- ארהרד, ר' (2001). אקלים חברתי מיטבי: ערכה לאבחון והתערבות. ירושלים: משרד החינוך התרבות והספורט, השירות הפסיכולוגי-יעוצי.
- בג"צ 1067/08 (טרם פורסם, פסק דין מיום 6.8.2009). עמותת "נוער כהלכה" נ' משרד החינוך.
- בג"צ 2814/97. ועדת המעקב העליונה לענייני החינוך הערבי בישראל נ' משרד החינוך, פ"ד נגד (3) 233.
- בג"צ 4363/00 (2002). ועד פוריה נ' שר החינוך, פ"ד נו(4) 203, 218.
- בלס, נ' (2008). אינדיקטורים הנוגעים לנושא מורים והוראה במערכות החינוך סקירת ספרות. אוחר ב-6 לספטמבר, 2009 מהאתר: <http://education.academy.ac.il/Uploads/BackgroundMaterials/indicators-morim-horaa-heb.pdf>
- בנבנישתי, ר', חורי-כסאברי, מ' ואסטור, א"ר (2005). אלימות במערכת החינוך בישראל – תשס"ה: דוח ממצאים מסכם. ירושלים: האוניברסיטה העברית בירושלים, בית הספר לעבודה סוציאלית.
- ברק, א' (2000). בג"צ 6698/95 קעדאן נ' מנהל מקרקעי ישראל, פ"ד נד(1) 258, 279.
- ברק, א' (2001). אוחר בספטמבר, 2009 מהאתר: http://www.shatil.org.il/files/58.arabedu_shivyon.pdf
- גביון, ר' (2005). מסגרות דיון למערכות חינוך בחברות רב-קהילתיות. בתוך ד' ענבר (עורך), לקראת מהפכה חינוכית, בעקבות כנס ון ליר לחינוך על יישום דוח דוברת. ירושלים: ון ליר.
- גבתון, ד' (2004). בציפיה למזרחי נ' מחלקת החינוך של טופי – גן השרון (לא נידון): מבט משווה וביקורתי על עמדת בית המשפט העליון כלפי האינטגרציה בחינוך בישראל. עיוני משפט, כח, 476-477.
- גולן-עגנון, ד' (2004). הקדמה. בתוך ד' גולן-עגנון (עורכת), אי-שוויון בחינוך. תל-אביב: הוצאת בבל.
- גולן-עגנון (2004). למה מפלים את התלמידים הערבים בישראל. בתוך ד' גולן-עגנון (עורכת), אי-שוויון בחינוך. תל-אביב: הוצאת בבל.
- גור, ח' (תשנ"ז). שוויון הזדמנויות ודיכוי של החרשים. עיונים בחינוך, 2, 205-219.
- גץ, ד', בוכניק, צ', זלמנוביץ, ב', תחאוכו, מ' ופרנקל, ס' (2007). כוח אדם מדעי וטכנולוגי בישראל – מוגש למועצה הלאומית למחקר ופיתוח. חיפה: מוסד שמואל נאמן למחקר מתקדם במדע וטכנולוגיה, הטכניון. אוחר ב-6 לספטמבר, 2009 מהאתר: <http://www.neaman.org.il/NeamanHeb/UpLoadFiles/DGALLERY/5925466518.pdf>
- דוברת, ש. (2005) כוח המשימה הלאומי לקידום החינוך בישראל (ועדת דוברת), התוכנית הלאומית לחינוך, משרד החינוך, ירושלים.
- דהן, מ' (2003). הוא (לא) זכאי – האם הצטמצמו הפערים? בתוך ש' שי ונ' ציון (עורכים), חינוך וצדק חברתי בישראל, על שוויון הזדמנויות בחינוך. ירושלים: המרכז לצדק חברתי ודמוקרטיה ע"ש יעקב חזן המכון ליר.
- דוח ועדת שושני. אוחר בדצמבר 2009 מהאתר: www.education.gov.il/moe/klali/doch.htm
- דוח מבקר המדינה מס' 42 (1991). אוחר בדצמבר 2009 מהאתר: <http://80.70.129.40/42.htm>
- דרמון, א' (2004). מורים – רישוי וקידום מקצועי. נייר רקע לוועדת דוברת.
- הרץ-לזרוביץ, ר', רוחאנא, נ', הופמן, י' ובית-הלחמי, ב' (1978). בית-הלחמי, השפעת מקצועות-הלימוד על עיצוב זהותם של תלמידים יהודים וערבים בישראל. עיונים בחינוך, 19, 153.
- ויסבלאי, א' (2006). אוחר בספטמבר 2009 מהאתר: www.knesset.gov.il/MMM/data/docs/m01585.doc
- זוזובסקי, ר' ונחמיאס, ר' (2008). אינדיקטורים הנוגעים במצב החינוך המדעי והטכנולוגי במערכת החינוך, סקירה מדעית. אוחר ב-6 לספטמבר, 2009 מהאתר:
- <http://education.academy.ac.il/Uploads/BackgroundMaterials/mada-tech-heb.pdf>
- חוק חינוך ממלכתי, התשי"ג-1953, תיקון התש"ס.
- יונה, י' (2005). הזדמנות למה? אוחר בספטמבר 2009 מהאתר:
- http://www.ha-keshet.org.il/articles/education/hizdamnut_lemma.htm
- לוי, ג' (2006). חינוך. בתוך א' רם ונ' ברקוביץ (עורכים), אי שוויון. ירושלים: הוצאת ספרים מוסד ביאליק.
- מזארי, א' א' (1996). מבנה השיוון בהזדמנויות חינוכיות במערכת החינוך הערבית במדינת ישראל. חיבור לשם קבלת התואר "דוקטור לפילוסופיה", בית הספר לחינוך, אוניברסיטת תל-אביב.

- משרד החינוך (2005). כוח המשימה הלאומי לקידום החינוך בישראל (ועדת דוברת), התוכנית הלאומית לחינוך. ירושלים: משרד החינוך.
- ניר, א', נפחא, מ' ושל-ויגיסר, י' (2008). אינדיקטורים תהליכיים בחינוך הציבורי, סקירת ספרות. אוחר ב-6 לספטמבר, 2009, מהאתר: <http://education.academy.ac.il/Uploads/BackgroundMaterials/process-indicators-heb.pdf>
- סבירסקי, ש' (2004). פערים בחינוך ומדיניות הפיתוח הכלכלי-חברתי בישראל. בתוך ד' גולן-עגנון (עורכת), אי-שוויון בחינוך. תל-אביב: הוצאת בבל.
- סבירסקי, ש' (1990). חינוך בישראל. תל-אביב: הוצאת ברירות.
- סחייק, ד' (2003). בחינות הבגרות: סקירת השינויים שחלו בבחינות הבגרות במהלך השנים ודיון במטרותיהן. אוחר ב-6 לספטמבר, 2009, מהאתר: <http://www.knesset.gov.il/mmm/doc.asp?doc=m00979&type=pdf>
- פרנקנשטיין, ק' (1977). כנות ושוויון, הרהורים של פסיכולוג ומחנך. בני ברק: ספרית פועלים.
- פרס, י', ארליך, א' ויובל-דוויס, נ' (1968). חינוך לאומי של נוער ערבי בישראל: השוואה של תכנית לימודים. מגמות, ט"ו, 36-26.
- קולמן, ג' (1989). המושג אי-שוויון. בתוך ר' שפירא ור' פלג (עורכות), הסוציולוגיה של החינוך, אסופת מאמרים (עמ' 204-216). תל-אביב: עם עובד.
- קופרמינץ (2009). אינדיקטורים אפקטיביים במערכת החינוך, סקירה מדעית. אוחר ב-6 לספטמבר, 2009, מהאתר: <http://education.academy.ac.il/Uploads/BackgroundMaterials/mada-tech-heb.pdf>
- רוסו, ז' ז' (תש"ה). אמיל או על דבר החינוך. ירושלים: דב-בר אהרונסון.
- רם, א' וברקוביץ, נ' (2006). שוויון ושוני - מבוא. בתוך א' רם ונ' ברקוביץ (עורכים), אי שוויון. ירושלים: הוצאת ספרים מוסד ביאליק.
- שבית, י' וארד (וייס), ח' (תשמ"ז). אינטגרציה בחינוך ופערים בין עדתיים בציונים ובשאיפות לימודיות. מגמות, ל, 304-288.
- שושני, ש' (2002). דוח הועדה לבדיקת שיטת התקצוב. ירושלים: משרד החינוך. אוחר ב-6 לספטמבר, 2009, מהאתר: http://www.education.gov.il/moe/klali/download/doch_male.rtf
- שי, ש' (2003). פתח דיבור. בתוך ש' שי ונ' ציון (עורכים), חינוך וצדק חברתי בישראל, על שוויון הזדמנויות בחינוך. ירושלים: המרכז לצדק חברתי ודמוקרטיה ע"ש יעקב חזן המכון ליר.
- <http://education.academy.ac.il/Uploads/BackgroundMaterials/calder-heb.pdf>
- שלוסר, א' (2008). דיווח מכינוס CALDER והמלצות נלוות. אוחר ב-6 לספטמבר, 2009, מהאתר: <http://education.academy.ac.il/Uploads/BackgroundMaterials/calder-heb.pdf>

Appendix A: Committee Members' Biographical Sketches

Moshe Justman is a professor of economics at Ben-Gurion University. His research interests are political economy of growth, inequality and education; analytical models of private and public education; dynamics of education, growth and income distribution; the balance between private and public education; industrialization, democratization and social policy; education and social capital; and fiscal decentralization of education. He has a doctorate from Harvard University (1982).

Bruria Agrest is a senior lecturer at the Bar-Ilan University School of Education. She worked as a biology teacher and then, from 1989 to 2004, served as chief inspector of biology for the Pedagogical Secretariat of the Ministry of Education. She also headed the science cluster in the Chief Inspectors' Administration (1999–2004). She was a member of the Dovrat Commission subcommittee on the training and professional advancement of teachers. Her research interests include teachers' thinking and judgment, evaluation methods, curricula, biology education, science education and ethics in science education. She has a doctorate in science education from the Hebrew University of Jerusalem (2001).

Abraham Arcavi is a professor in the Department of Science Teaching at the Weizmann Institute of Science and at the Hebrew University of Jerusalem. His research is on the teaching and learning of mathematics in high schools. He began his training as a researcher in mathematics education in Argentina and completed it in Israel. He headed the Department of Science Teaching at the Weizmann Institute from 2001 to 2005. He has a doctorate in mathematics education from the Weizmann Institute (1986).

Rami Benbenishty is a professor and head of the research group on mental health and well-being in childhood and adolescence at the School of Social Work and Social Welfare of the Hebrew University of Jerusalem. His main research interests are child welfare, decision-making and the effective use of information. In recent years he has been involved in monitoring in-school violence and the school climate on the school, municipal and state levels. He is on several public committees on children at risk. He has a doctorate in social work and psychology from the University of Michigan (1981).

Avishai Henik is a professor of psychology at Ben-Gurion University of the Negev. He is dean of the Faculty of Humanities and Social Sciences and holds the Zlotowski Chair of Cognitive Neuropsychology. His research is in cognitive neuroscience, especially attention, processing of individual words and processing of numerical information. In recent years he has broadened his research to include learning disabilities. He was formerly the head of the Department of Behavioral Sciences and the Zlotowski Center for Neuroscience at Ben-Gurion University. He has a doctorate from the Hebrew University of Jerusalem.

Michael Karayanni is an associate professor in the Faculty of Law at the Hebrew University of Jerusalem. He holds the Silver Chair in Civil Procedure and is the Director of the Harry and Michael Sacher Institute for Legislative Research and Comparative Law. He is a member of the Forum of Young Scholars at the Israel Academy of Sciences and Humanities and a past recipient of the Rothschild Prize and a Fulbright fellowship. His research focuses on private international law and inter-religious law, civil procedures, and multiculturalism. Professor Karayanni holds an LL.D from the Hebrew University (2000) as well as an S.J.D. from the University of Pennsylvania (2003).

Moshe Zeidner is a professor of educational psychology at the University of Haifa. His research interests are personality, intelligence, interpersonal differences and psychoeducational assessment. He headed the doctorate

committee of the University of Haifa Faculty of Education in 1999–2000 and served as dean of research at the university from 2000 to 2005. He is the founder and director of the Center for the Interdisciplinary Research on Emotion and the scientific director of the Laboratory for Intercultural Research on Personality and Emotion. He has a doctorate in educational psychology from the Hebrew University (1984).

Gabriel Bukobza, Study coordinator

Faculty member, Department of Developmental Perspectives of Education at Tel Aviv University's School of Education and adjunct lecturer at the Hebrew University of Jerusalem. His research concerns adolescent development, the relationship between adolescent rebellion and identity formation and father-son relationships. He holds a Ph.D. in psychology from the Hebrew University of Jerusalem (2004).

Appendix B: List of Scientific Reviews and Links

The reviews listed below were commissioned by the committee as background materials for its study and deliberation. Links, where presented, are to summaries or full reports available in English.

- Teachers and Teaching: *Mr. Nachum Blass, education and social planning consultant*
<http://education.academy.ac.il/Uploads/BackgroundMaterials/english/Indicators-Blass-teachers-summary-eng.pdf>
- Equality of and gaps in educational opportunity: *Prof. Jacques Silber, Bar Ilan University*
<http://education.academy.ac.il/Uploads/BackgroundMaterials/english/Indicators-Silber-oportunities-eng.pdf>
- Equality of and gaps in educational opportunity, *Mr. Nachum Blass, education and social planning consultant*
http://education.academy.ac.il/Uploads/BackgroundMaterials/english/Indicators-Blass_inequalities_summary-eng.pdf
- The EGEMS structure and its uses: *Prof. Sorel Caha, Hebrew University of Jerusalem;*
* Response by *Prof. Henry Brown of Boston College;*
<http://education.academy.ac.il/Uploads/BackgroundMaterials/english/indicators-braun.pdf>
* Comments on Prof. Cahan's paper by *Prof. Michal Beller, Director General of RAMA*
- Measuring the impact of teachers on student achievement: *Dr. Analia Schlosser, Tel Aviv University*
- Science and technology education: *Prof. Ruth Zuzovsky and Prof. Rafi Nachmias, both of Tel Aviv University*
<http://education.academy.ac.il/Uploads/BackgroundMaterials/english/Indicators-Zuzovsky-Nachmias-Sciense-eng.pdf>
- The status of the child in the education system: *Prof. Asher Ben-Arieh, Hebrew University of Jerusalem*
- Gifted students: *Dr. Inbal Shani, University of Haifa*
<http://education.academy.ac.il/Uploads/BackgroundMaterials/english/Indicators-shani-gifted-eng.pdf>
- Affective skills; *Dr. Haggai Kupermintz, University of Haifa*
- Process indicators: *Dr. Adam Nir, Hebrew University of Jerusalem*

Appendix C: Seminar Agenda

Seminar: Issues in the Construction of Indicators for the Israeli Education System Sunday, December 28, 2008, Van Leer Institute, Jerusalem

Seminar agenda

9:00 – 9:30 **Gathering and registration**

9:30 – 10:00 Greetings: Prof. Menahem Yaari, President, The Israel Academy of Sciences and Humanities

Opening remarks: Prof. Moshe Justman, Committee Chair

10:00 – 11:30 **First Session – Indicators for gaps and equality of opportunity in education**

Moderator: Dr. Michael Karayanni

Presenter: Prof. Jacques Silber – Bar-Ilan University

Responders: Prof. Yossi Shavit – Tel Aviv University

Noam Zussman – Research Division, Bank of Israel

Discussion with audience participation

11:30 – 11:45 **Break**

11:45 – 13:15 **Second Session – Indicators for teachers and teaching**

Moderator: Prof. Moshe Zeidner

Presenter: Nachum Blass – Taub Center for Social Policy Studies in Israel

Responders: Prof. Shlomo Beck – President, Kay College

Prof. Anat Zohar – Director, Pedagogical Affairs, Ministry of Education

Discussion with audience participation

13:15 – 14:15 **Lunch Break**

14:15 – 15:45 **Third Session – Use of indicators to assess achievements**

Moderator: Prof. Avishai Henik

Presenter: Prof. Sorel Cahan – Hebrew University of Jerusalem

Responders: Prof. Henry Braun – Boston College (in English)

Prof. Michal Beller – Director General, National Authority for Measurement and Evaluation in Education

Discussion with audience participation

15:45 – 16:00 **Break**

16:00 – 17:00 **Summary Plenum – General discussion with audience participation**

Introduction: Shlomit Amichai, Director-General, Ministry of Education

Moderator: Prof. Rami Benbenishty

Concluding Remarks: Prof. Moshe Justman