

## **Application of SAM**

### *SAM Incorporation in the Education System*

The SAM toolkit was developed for schools as an instrument to monitor the educational process. It is assumed that monitoring results will be accessible to municipal education authorities, and can also be made available to other stakeholders for study and analysis. However, in all cases, the assessment of learning outcomes should possibly remain an internal process, i.e., be performed at the school initiative within the education community striving to achieve a common goal: improved quality of school students' education.

Given the relative novelty of the SAM toolkit, assimilation by the users of the principles of its construction and functioning is the main factor of the toolkit application. Therefore, SAM incorporation in the local education system should begin with a series of awareness-raising workshops that could be arranged by centers for education quality assessment as the key holders of monitoring technologies within the local education community. The launching workshops for all categories of education workers should be focused on the understanding of SAM ideology, theoretical basis and constructional peculiarities in the context of the modern practice of education outcome assessment.

The topics of subsequent workshops should be specified in accordance with the objectives addressed at different levels of the education system.

After getting familiarized with the SAM, the staff of education management authorities could discuss the prospects of using testing data in the governance of the municipal education system.

For school principals and head teachers, it would be useful to discuss the approaches to introducing SAM in the performance of school teams, as well as the options and timing of the testing, and possibilities to improve the educational process based on evaluation results.

For teachers, familiarization with SAM principles and construction could be followed by a discussion where they can refer their own vision of the educational process, teaching, testing and evaluation materials with the proposed three-level system. It is also advisable to hold a workshop dealing with modern teaching methodologies correlated to the contemporary general education objectives. It is important to facilitate a detailed review of the three-level system including the analysis of specific tasks from relevant subject areas. In addition, the teachers themselves should be given an opportunity to complete the tests, which could be followed by a hands-on seminar on distinguishing the levels of test items taken from conventional problem books and textbooks.

It is advisable that such seminars be attended by both primary school teachers and all other teaching staff members. This is related, first, with the need to develop a common professional language within the teaching staff, and, second, with the prospects of using SAM tests at the basic school level.

The next step in SAM incorporation implies the organization and carrying out of testing.

One-time diagnostics of primary school learning outcomes is the main option of SAM application being of interest to all participants of the education community. It is this option that should become the first experience of SAM application. For strategic considerations, the testing should take place at the beginning of the fifth schooling year, and performed by 5-th grade teachers as part of diagnosing the students' preparedness to the basic school. Direct interest of basic school teachers to such diagnostics serves the best guarantee to ensure that testing is conducted with high quality and in compliance with all relevant standards.

In fact, the autumn testing supplies data to assess the outcomes of previous education, i.e., provides feedback to primary school teachers. Such deferred feedback should reduce the emotional aspect of the assessment, and, as a consequence, facilitate a more impassive and

reflective analysis by the teacher of his/her previous performance at the beginning of the work with newly enrolled first-grade students.

Regular (annual) implementation of such diagnostics can be viewed as primary education monitoring at different scales (from school level to the municipal education system).

As soon as the above monitoring is arranged, and some experience in the analysis and use of its results is gained, the second option of SAM application can be introduced – monitoring of individual progress – that is mostly relevant at the school level. Such monitoring is focused on tracing progress in the development of subject competences of individual students, and is to be conducted during the third and fourth schooling years in three-four consecutive series. Testing series include parallel SAM versions based on the subject content of the curriculum covering the period from the beginning of the first grade to the beginning of the third one.

Monitoring results are of substantial interest to the school and, above all, to the teacher who, in this case, has sufficient time to try and fill the knowledge gaps identified by the testing.

### *Analysis and Use of Entry/Exit Testing Results*

The previous section described major indicators used in the basic version of diagnostics: primary and test score, profile and grades of achievement. If the list is supplemented with derived indices (e.g., distribution of students by grades of achievement, comparative data on assimilation of the main subject content areas, individual progress monitoring data), the set of benchmarks becomes so extensive that it would require special clarifications on its application. This section of the manual deals with the use of various results of entry/exit testing by major education stakeholders.

### *Municipal Education Management Authorities*

Municipal education management authorities can be interested in the following set of indicators:

- Test score – *class / school / city*
- Distribution of students by grades of achievement – *class / school / city*
- Test score for each content area – *city*
- Distribution of students by grades of achievement for each content area – *city*

*The city-average test score* gives an indication of the general level of educational outcomes for the school network as a whole. This scale score can be directly compared to region-average statistical indicators, as well as similar data from other cities (or regions) thus allowing a comparative evaluation of the local school system.

*School- and class-average test score* enables to evaluate the achievements of each school and class as compared to other schools and classes, both local and those located in other cities.

In the context of education management objectives, it is important to identify classes with achievements corresponding to the sociocultural norm with a view to reveal a group of efficient teachers who can share useful experience. In the future, such teachers could be engaged in various educational events at the city level.

*Distribution of students by grades of achievement* is a highly informative indicator for an education manager. At the city level, it characterizes the qualitative composition of the student population. The data can be compared to similar indicators at the class and school level to identify “problem zones”, i.e., schools where a comparatively large share of students failed to assimilate even the first level of the subject content. Attention should also be given to schools where a substantial share of students demonstrates the first level of assimilation, i.e., fail to comply with the cultural and age norm. The norm was derived from theoretical considerations,

and is still being tested and compared with actual data. Nevertheless, non-compliance with this norm should rather be kept in sight.

Educational situation in such schools should be further studied *in-situ* with a view to find ways for its improvement.

*Distribution of students by grades of achievement at the school level* is a measure of child population homogeneity in terms of academic achievements. The factor of class homogeneity/inhomogeneity has long come up to the attention of educationalists. There are at least two points of view on this matter: a) one should strive to ensure homogeneity through segregating students with different levels of achievement in different classes and schools; b) inhomogeneity is useful, provided that students with different achievements are equally represented in a class (school).

Given the scope of the issue, it seems expedient to offer it for a wide discussion, as well as encourage a comparative study of educational situations in classes and schools differing by academic homogeneity. In this case, application of SAM will provide an unbiased framework for evaluating the students' homogeneity/inhomogeneity in terms of academic achievements.

Context specialists can be interested in the analysis of specific context area assimilation based on comparison of relevant test scores and distribution by grades of achievement at the city level. Such data can be useful for defining priority steps to improve education methods and professional upgrading of teachers.

## *School*

### *School administration*

School administrations are interested in:

- Test score – *class / school / city*
- Distribution of students by grades of achievement – *class / city*
- Profile – *class*

*Average test score of each class in the given school and city* enables to compare classes between themselves in terms of academic achievements, and also to compare school outcomes with those at the city level, as well as with the sociocultural norm. Awareness of such information allows the administration to evaluate the position of their school in the education environment of the city and region, as well as assess the chances of their students to continue education at universities.

*Individual test scores* enable to identify the most advanced students for participation in city olympiads.

It is also important for the administration to have an understanding of *the students' distribution by grades of achievement*. These data, which characterize the zone of students' proximal development (ZPD), can be useful to identify potential vectors of actions with a view to improve overall academic achievements. This information is also relevant for addressing the issue of academic homogeneity/inhomogeneity in individual classes. In addition, the administration thus obtains some grounds to inform decisions on methodological support to teachers, in particular, through sending them to professional upgrading courses.

*Profile of a class*, which shows a relative share of completed items in the given test, in comparison with profiles of parallel classes, as well as model testing results provides some information on the teacher's strategy and its focus on achieving a certain level of content assimilation.

### *Basic school teachers*

This category of users is primarily interested in *distribution of students by grades* of assimilation of the primary school curriculum. This indicator allows the teachers to get some prior insight into what share of students would likely face difficulties in the assimilation of new concepts. The same distribution that characterizes the structure of student population will provide some basis for defining the teaching strategy: timing and forms of subject content presentation, ways of organizing students' communication in class, etc.

It is advisable that basic school teachers who get relatively poorly achieving classes should try and fill the gaps in the assimilation of primary school content as part of new content presentation, and, by the end of the 6-th grade, conduct another testing using the SAM toolkit for primary school.

It is also useful to apply the SAM toolkit in the 8-th or 9-th grades to identify students who complete the tests at the level of absolute cultural norm.

### Primary school teachers

Primary school teachers can elicit the greatest amount of useful information from the SAM toolkit and results of its application. The mere familiarization with the SAM toolkit provides references for the understanding of key aspects of the educational process: a technological framework of the test which defines the primary units and sections of the subject content; a three-level system which models the process of content assimilation; types of test items structuring the scope of subject content. When assimilated, this system of generalized concepts will supplement the set of references for the educational process organization and management.

As to the results of exit testing, they allow the teacher to objectively evaluate his/her performance, analyze the successes and failures, and outline approaches to the work with newly enrolled students.

Primary school teachers are interested in all SAM indicators characterizing individual students and classes:

- Test score – *student / class*
- Grade of achievement – *student*
- Distribution of students by grades of achievement – *class*
- Profile of achievement – *student/ class*
- Matrix of primary estimates for each test item – *student/ class*

*Test scores of individual students and the class* are scale indicators that help the teacher to evaluate the achievements of each student in comparison with those of his/her classmates and students from parallel classes, achievements of the whole class in comparison with parallel classes, as well as compare these indicators with the average statistical data and sociocultural norms.

*Grade of student's achievement* is a qualitative indicator that can be evaluated in comparison with the age norm.

*Distribution of students in the class by grades of achievement* provides an insight into the composition and number of groups differing in the attainment level. The distribution pattern enables to evaluate the way in which the educational process is organized in the given class.

The above three indicators (shown on the metric scale) provide the teacher with a sound basis for retrospective analysis of his/her performance. In addition, testing results contain additional information enabling to detalize the concluding picture of learning.

Thus, the *profile of achievement in the class*, being compared with profiles of parallel and model classes, allows the teacher to better understand the actually implemented teaching strategy and the focus of applied teaching methods.

*Profiles of individual students' achievement* allow the teacher to evaluate their learning trajectories, and compare unbiased data with his/her intuitive perception.

And finally, *the matrix of primary estimates* for each test item, given that test books are available to the teacher, provide an extensive factual information enabling to analyze the difficulty of certain test items for the class or individual students.

### *Analysis and Use of Individual Progress Monitoring Results*

In addition to exit testing upon completion of the primary school, SAM toolkit can be used to monitor the development of learning competences. There is a substantial difference in the two options of SAM application. Thus, while the exit test provides an unbiased evaluation of academic achievements at a given school compared to the situation in other schools of the city or even the region with a view to understand the prospects and develop strategies for the whole school, individual progress monitoring is focused on the educational process in individual classes and ways of its improvement. Since there is no need to compare monitoring results with similar data from other schools, it is possible to more widely use primary scores and profiles, which (while not being measured data) provide quite a lot of information for the teachers.

Monitoring is performed using the method of longitudinal studies that enables to establish the status of an object at various stages of its development. This is a classical approach in psychological studies but there are cases of its application in educational testing.

The method of longitudinal studies provides a series of measurements, each of which can be conventionally considered as an exit result of the previous stage of education. At the same time, it enables to focus on the analysis of changes (increase) in competences from study to study, and evaluate progress intensity. This assessment is called a “value-added” method.

Conventional education tests mostly provide quantitative assessment of individual progress. Application of SAM enables to measure both quantitative (linear progress) and qualitative (level progress) competence increase. Recall that the evaluation framework in the SAM technology includes absolute age and cultural norms, which makes the assessment more comprehensive.

The list of individual progress monitoring indicators includes:

<b>Indicators under each study</b>	<b>Objects of evaluation</b>
Primary score	student / class
Profile достижений	student / class
Grade of achievement	student
Distribution of students by grades of achievement	class
<b>Indicators of increase</b>	
Linear progress	student / class
Level progress	student

### *School administration*

School administrations are interested in individual and group indicators of baseline achievements and intensity of subsequent content assimilation:

- Primary score – *student / class*
- Profile of achievement - *class*
- Distribution of students by grades of achievement - *class*
- Linear progress – *student / class*

*Primary average score* for each class and each student as obtained from the first testing allows the administration to compare baseline (monitored) situations for different classes and students, and get an insight about the student body.

*Distribution of students by grades of achievement* in each class provides a differentiated vision of the students' zone of proximal development, and enables to evaluate the adequacy of the educational process in different classes.

*Profiles* derived from the first testing data further specify the overall picture of achievements, and enable to more accurately evaluate the actual up-to-date focus of the educational process in each class.

*Linear progress* of the class and each student, together with the rank scale of individual achievements, provides information on the intensity of the overall educational process, and distribution of achievements between strong and weak students.

The whole set of the above data provides some references for the administration to consult with teachers, and organize workshops to discuss the revealed challenges and elaborate approaches to improve the organization of the educational process.

### Primary school teachers

The following indicators are of interest to primary school teachers:

- Primary score – *student / class*
- Profile of achievement – *student / class*
- Grade of achievement – *student*
- Distribution of students by grades of achievement - *class*
- Linear progress – *student / class*
- Level progress – *student*

*Primary scores of students and class-average score*, compared with the results from parallel classes, allow the teacher to tentatively evaluate his/her performance, and pinpoint the baseline level in the framework of initiated monitoring.

*Students' grades of achievement*, compared with the scale of primary scores, enable to evaluate the ZPD of each student.

*Students' profiles of achievement* describe individual progress trajectories.

*Profile of achievement* for the class, compared with profiles of parallel classes, enables to better understand the actual focus of the education process.

*Distribution of students by grades of achievement* characterizes the structure of the class, and provides benchmarks for the overall organization of the education process.

*Linear progress* of the whole class, compared with similar data from parallel classes, demonstrates relative intensity of the education process.

*Linear progress* of students enables to distinguish the share of individuals for whom the learning conditions appeared ineffective.

*Level progress* of students helps the teacher to keep a view of the absolute reference – the age norm, and the extent to which individual students are approaching it.

### **Conclusion**

This manual describes two basic options of SAM application as way to obtain a teaching feedback, and presents the list of major indicators providing information of the educational process, its conditions, actual focus and results. At the same time, practical use of this toolkit offers new opportunities that are still to be explored and interpreted. Thus, for example, there is an interesting experience of using three-level test items in class and homework.

Of special interest in the typology of educational situations related to SAM application that gradually generates the experience in making efficient managerial and teaching decisions. So far

the experience is rather small and should not subject to hasty generalization. At the same time, individual cases of productive SAM application in various situations can be initially used as a methodological and moral support to those who are making their first steps in this area. Three case studies are given in annexes.

#### Literature

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