Hybrid model for quality evaluation in secondary education

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Abstract. The paper introduces a hybrid model for quality evaluation of the educational process in high school, based on a set of qualitative and quantitative indicators. The model overcomes the subjectivity of external evaluation by using a relatively small number, clear and objectively measurable criteria for different types of indicators, divided into 12 groups. All 132 indicators (75 qualitative and 57 quantitative) are measures of the educational process from different points of view - to measure compliance of essential quality criteria with European and national best practices, to objectively compare specific numerical indicators, etc. Quality indicators are evaluating by using two types of measuring scales. The first type is suitable for such indicators which are used mainly to classify the assessed objects according to a specific characteristic. The second type of measuring scales are suitable for indicators, the values of which are used to compare the qualities of objects. The proposed hybrid model for quality evaluation of high schools uses 4 measurement scales, based on relative measurements of 57 quantitative indicators.

1. Introduction

After the adoption of the new Law on Preschool and School Education in 2015 [1], more attention is paid to the quality assessment in secondary education. On the one hand, the quality of secondary education in Bulgaria, has to meet the requirements of the Law on Preschool and School Education and other normative documents. On other hand, it has to meet the expectations of students, parents and other stakeholders (society, business clusters, employers, etc.).

Until now, a number of normative documents have been adopted [2], [3], [4], [5], [6], [7], [8], which regulate certain aspects of quality management, as well as the attestation of schools and teachers. A system of standards with measurable criteria and indicators, as well as a methodology with clearly defined stages and rules for self-evaluation of Bulgarian schools, has not yet been adopted. According to current legislation, each secondary school in Bulgaria has to propose its own system of measures to improve the quality of education. The National Inspectorate of Education conducts appropriate inspections throughout the country. The National Inspectorate of Education (established in 2018) started its activities with experimental inspections in schools and kindergartens throughout the country. Criteria and indicators for quality evaluation of secondary education have been developed, in compliance with the regulations and state educational standards to the Law on Preschool and School Education. According to them, the quality of education is determined based on a set of indicators characterizing different aspects of educational activities: learning content, forms and methods for training, staff and factors that ensure the development of students’ competencies. For the objective evaluation, it is necessary to take into account other factors - school environment and conditions, content and organization of the educational process, expectations of students, parents and other stakeholders (society, business and employers), etc.
Until now there is no formal model based on which to conduct not only research on the adequacy of various systems for quality evaluation and monitoring of different objects in Bulgarian secondary education as well as to proceed to experiments for their automation. This encourages studies to offer a universal model with quantitative and qualitative indicators that can be easily adapted to the needs of a particular educational institution. On the one hand, such a model will make it possible to overcome the subjectivity of external evaluation by using a set of objective and measurable quality criteria. On the other hand, such a model will allow inspectors from the evaluating institution to compare the evaluations received from all schools in the country.

For a comprehensive assessment of the quality of objects in a given subject area (SD), based on a set of a finite number of quality criteria, each of which is accompanied by indicators with their measurement norm, it is necessary to solve two problems:

P1. Creating an adequate model of SD and its elements in terms of quality criteria and a corresponding system of qualitative and quantitative indicators;

P2. Providing a methodology (algorithm) for the formation of numerical assessment of the quality of objects in SD based on the values of their indicators in relevant measurement systems.

The solution to problem P1 strongly depends on SD. If an indicator (respectively quality criteria), called in this case ‘composite’, has a more complex nature, the question arises about the type of connection (systemic or structural) between the composite indicator and its components.

Based on an investigation of requirements for quality evaluation of learning in Bulgarian schools defined in normative documents and laws, such as Pre-school and School Education Act [1], Inclusive Education Ordinance [7], Ordinance No. 8 on Information and Documents for the Pre-school and School Education System [6], Ordinance No. 11 on the Evaluation of Student Learning Outcomes [5], Ordinance № 12 on the status and professional development of teachers, principals and other pedagogical specialists [3], Ordinance No. 13 on civil, health, environmental and intercultural education [4], Ordinance No. 15 on the Inspection of Kindergartens and Schools [2], National Inspectorate of Education [8] and previous studies [9], [10] which propose a general model suitable for dynamic quality evaluations of objects in different SD (especially in the field of higher education), this paper propose a general model that can be adapted to the needs of each school.

2. Models for quality evaluation in secondary education – state of the art

In Europe external evaluations use standards defined by the ministry, and the outcome of the assessment is mainly intended for the ministry [11]. There are also a minority of cases where the external evaluation is carried out by centralized bodies (state or region). The main evaluated aspects are teachers’ preparation and competence, teaching methods, student outcomes, drop-out rate, organization and management of the school, environmental and building conditions, stakeholder engagement, social context, and integration. The evaluation is therefore intended as a stimulus to develop an operational management mechanism to lead the school action: from planning to performance of functions, from management to organizational structure and from communication to stakeholder engagement. In European countries [11] management bodies (school manager or groups of subjects within the institute (manager, teaching staff, administrative staff) are responsible of internal evaluation and/or stakeholders (representatives of students and parents).

In Romania the evaluation is carried out by external commissioners reporting to the head teacher. The internal evaluation analyses the school as a whole, considering aspects such as quality of teaching (evaluation of teachers and students), organization, leadership, management of economic resources, facilities, outcomes. The authority responsible for the educational system (ministry, central authority) provides common tools and indicators, e.g. guidelines, frameworks, websites, performance statistics. In some countries, schools can define their methods, e.g. analysis of strengths and weaknesses and feedback questionnaires among stakeholders [11].

Looking at Our School 2016: A Quality Framework for Primary Schools [12] has two dimensions - Teaching and Learning and Leadership and Management. Each dimension is divided into 8 (Learner Outcomes, Learner Experiences, Teachers’ Individual Practise, Teachers’ Collective/Collaborative
Practise, Leading Learning and Teaching, Managing the Organization, Leading School Development, Developing Leadership Capacity), representing the distinct, although interrelated aspects of the dimension. Standards are then provided for each domain. The standards are stated as the behaviours and attributes characteristic of practices in an effective, well-functioning school. For each standard, statements of practice are given at two levels – statements of effective practice and statements of highly effective practice, each of which can be identified as existing practice or goal to achieve. Taken together the statements of effective practice and highly effective practice should enable teachers, school leaders and others involved in internal or external evaluation to arrive at evidence-based evaluative judgements about the quality of aspects of a school’s provision. They should also enable teachers and school leaders to plan the next stage in the improvement journey for their own teaching or for their school’s provision. The emphasis should be on the relevance of the statement to the school and its usefulness in bringing about school improvement.

The quality evaluation of secondary education in Germany [13] and the United Kingdom [14] is based on school self-evaluation and external inspection. Leading indicators are student outcomes in international studies, trends in international mathematics and science study, the program for international student assessment, progress in international reading literacy study.

The Quality Assurance and Inspection Division in Mauritius have developed its Quality Assurance Framework [17] and Handbook for Quality Assurance Exercise. These documents set out benchmarks and quality standards in secondary education, give a new sense of direction to secondary schools through the structuring of quality assurance initiatives and chart a path for school improvement. The Quality Assurance Framework contains 51 performance indicators allowing evaluation of the overall effectiveness of the school in five domains (key results areas): A. Student Attainment, B. Teaching and Learning, C. Leadership and Management, D. School Ethos and Climate and E. School
Infrastructure. The Quality Assurance Exercise is carried out through school self-evaluation and external evaluation by a team of Quality Assurance Officers based on one or more school Visits. Performance Level (GOOD, ADEQUATE, COULD DO BETTER) is determined for each area depending on the number of met indicators from it evaluated with Green, Amber or Red. The overall school effectiveness will depend on the status reached by the school in each of the five domains. A school will thus be classified as ‘GOOD’, ‘ADEQUATE’ or ‘REQUIRES IMPROVEMENT’ based on criteria set as follows: GOOD (GOOD in B, GOOD in A or C, and at least ADEQUATE in remaining domains); ADEQUATE (At least ADEQUATE in A, B, C, and D or E) and REQUIRES IMPROVEMENT (Otherwise).

In the Netherlands [18] types of evaluation range from being embedded in centralistic control measures to internal “formative” assessment procedures that are seen as instrumental to the development of individual students and schools. The conceptual framework for evaluation is based on the distinction of three basic functions of evaluation: accreditation/certification, accountability and improvement. As a second dimension, three basic data strategies are distinguished, test and assessment data, administrative data and educational statistics, and data based on systematic inquiry and review. Various levels of the educational system, the national system level, the school level, the teacher level and the student level are used as a third dimension.

The Education Quality Indicator (EQI) [19] framework consists of seven Critical Success Factors (Curriculum Organization, Delivery Method, Organizational Support, School Infrastructure, Student Achievement, Teacher Attitude, Teacher Competence) and is evaluated through twenty-eight Key Performance Indicators with measurements scale and required data for each indicator. This framework provides a well-grounded starting point in further developing a tangible measurement to assure education quality that is general in nature to be implemented at different levels of education and different settings of education schemes.

The model for quality evaluation in Bulgarian secondary education (proposed in the previous study [20]) contains 12 groups with 104 indicators. For its creation, the European experience and trends as well as the Bulgarian legislation, are taken into account.

3. Hybrid model for comparative evaluation of objects of the same type

Each model for quality evaluation of objects from SD regarding specific quality criteria Q presupposes to be determined: indicator (or norm) \( L_Q \) (for which the quality of objects from SD is measured), measuring scale \( R_Q \) (set with all assessments of objects from SD) and methodology \( M_Q \) for evaluating the degree of conformity \( L_Q(s) \) of each object \( s \in SD \) to a norm \( L_Q \).

Each quality criteria presents a point of view (aspect) for evaluating an object \( s \in SD \) (as a whole) or elements related to its life cycle (objects, activities, subjects, etc.).

The reporting of the degree of compliance with quality criteria can be done based on quantitative indicators (evaluated by relevant digital data) or qualitative indicators (evaluated by experts). In both cases, the degree of conformity is evaluated within the appropriate measurement scale - quantitative assessments are the result of algorithmic type methods (applied to digital data for \( s \)) and the qualitative – of expert opinions for \( s \).

An indicator – quantitative or qualitative, can be used to compare the quality of two objects, only if in the set of its values (whether discrete, analogue or hybrid) is introduced a complete order, in particular - for every two objects can find out what is the ordinance between the respective values of the indicator.

In order to compare quality assessments for any two objects \( s', s'' \in SD \) with regard to a quality criteria \( Q \), it is necessary to introduce a complete ordinance in \( R_Q \) (or in a set \( Ind_Q = \{L_Q(s): s \in SD\} \), i.e. a reflective, strongly antisymmetric and transitive relation over a Cartesian square \( R_Q \times R_Q(Ind_Q \times Ind_Q) \).

An interest for practice is the problem of quality evaluation of complex objects \( s \in SD \) on a given aspect (context, criteria) \( Q \), based on a set of finite number of quality criteria \( K = \{K_1, K_2, ..., K_M\} \), each
of which is associated with a measurement scale $R_i$, methodology $M_i$ for evaluating the degree of conformity $L_i(s)$ of $s$ (regarding norm $L_i:SD \rightarrow R_i$), $i = 1, 2, \ldots, M$.

The evaluation of the degree of compliance of an object $s$ in $SD$ regarding given quality criteria (or system) is done through a set of quantitative or qualitative indicators of objects in $SD$. In both cases, the degree of compliance is evaluated within a relevant measurement scale with the difference that quantitative assessments are the result of the algorithmic (computational) methods applied to digital data for $s$, and qualitative - of expert opinions for $s$.

Solving the task of evaluating a finite set of objects of the same type in $SD$ (with the introduced quality criteria, indicators and relevant measurement scales and norms for compliance) requires overcoming some problems.

**The first problem** is related to the need to suppress the subjective expert evaluations of quality indicators which depend on many factors - an experience of the respective evaluators, following higher (or lower) objectives and requirements, a manifestation of objectively unfounded tolerance or criticism, etc., to form adequate assessments. A possible solution for overcoming subjectivism is to extrapolate an expert evaluation for an individual object and all other objects, and on this basis to form "averaged" assessments for all evaluated objects.

**The second problem** is related to the transformation of the set of values of a given quantitative indicator for the considered objects to numerical assessments. The essence of the problem lies in the fact that, in the general case, the ratio between the values of a given quantitative indicator for two objects is not equal to the ratio between the respective assessments.

Solutions to both problems in the general case (hybrid model for quality evaluation in $SD$) will be presented elsewhere. We will illustrate our approach with the example described below.

**Example.** Eight high schools are evaluated simultaneously by eight experts. There is a list of values of 5 quantitative indicators (it is assumed that a higher value of a quantitative indicator leads to a higher final grade), and an expertly determined (by qualitative indicators) assessment in the range $[0, 10]$ (see Table 1) for each school. It is necessary experts to form eight grades (again in the interval $[0, 10]$), adequate to the sets of values of quantitative indicators in Table 1.

| High School | Expert assessment on qualitative indicators | Values of quantitative indicators |
|-------------|---------------------------------------------|----------------------------------|
|             |                                             | 1 | 2 | 3 | 4 | 5 |
| 1           | 9.7                                         | 30| 10| 3 | 60| 4 |
| 2           | 8.1                                         | 40| 8 | 3 | 50| 3 |
| 3           | 4.5                                         | 20| 3 | 1 | 30| 1 |
| 4           | 6.7                                         | 10| 5 | 1 | 55| 2 |
| 5           | 8.6                                         | 30| 8 | 2 | 62| 3 |
| 6           | 9.7                                         | 40| 12| 3 | 70| 4 |
| 7           | 7.4                                         | 20| 7 | 2 | 60| 2 |
| 8           | 9.4                                         | 20| 10| 4 | 65| 4 |

A solution to this task, which also takes into account the formulated two problems, is impossible if a framework is not defined in which the same can be calibrated and defined. Different "calibration" frameworks are possible (their consideration is not the subject of this paper). A commonly used "calibration" approach is the preliminary classification of objects (in this case high schools) into some clusters, e.g. classification of high schools into three groups: 1st (25% of high schools with the highest grades) 2nd (next 50%) and 3rd (last 25%). Based on the framework, Table 2.1 should be created, in which (based on Table 1) data are formed (accuracy two digits after the decimal point) for hypothetical high schools - representatives of the clusters.
Table 2. Data sets for indicators and expert assessments for 5 hypothetical high schools.

| Hypothetical high school | Values of quantitative indicators | Overall expert assessment (grade) |
|--------------------------|-----------------------------------|----------------------------------|
|                          | 1       | 2      | 3      | 4      | 5      |                |
| Max                      | 40      | 9.7    | 4      | 70     | 4      | 9.7             |
| X1                       | 36.25   | 9.1    | 3.62   | 65     | 3.75   | 9.1             |
| X2                       | 25      | 7.2    | 2.5    | 50     | 3      | 7.2             |
| X3                       | 11.88   | 5.1    | 1.19   | 32.5   | 2.12   | 5.1             |
| Min                      | 10      | 4.4    | 1      | 30     | 2      | 4.4             |

2.1. Data sets

The first two high schools (see Max and Min rows) have maximum (respectively minimum) values of the corresponding indicator in Table 1. The values in Max(Min) row can be interpreted as data for a hypothetical high school, which has the highest(lowest) score of all its quantitative indicators in comparison with all other high schools. Rows X1, X2 and X3 can be interpreted as data (in this case, their values divide the interval between the respective minimum and maximum value in the ratio 0.125: 0.5: 0.875) of typical (but again hypothetical) representatives of the three groups.

When conducting the final evaluation procedure, Table 2.1 is available to the experts who have made assessments of the quality indicators of the high school from Table 1. The experts are asked to evaluate the five sets of quantitative indicators of "hypothetical" high school, and the arithmetic mean of the eight expert assessments for a given "hypothetical" high school, determine the overall expert assessment of its quantitative indicators. Table 2.2. presents an example of the result of such an evaluation procedure.

Finally, based on the overall expert assessments of "typical" high schools from Table 2.2, a corresponding grade can be calculated for each specific set of values of quantitative indicators. For example, for the high school from Table 1, Row 5 with a set of \{30, 8, 2, 62 and 3\}, by interpolation of values of respective indicators (with consecutive indexes) of the hypothetical high school, a set of numerical estimates is obtained (with the accuracy two digits after the decimal point) \{8.04, 7.48, 6.2, 8.72, 7.2\}. Hence (with equal weights of the quantitative indicators) a **general expert assessment of 7.53** (= 8.04 + 7.48 + 6.2 + 8.72 + 7.2)/5 is obtained.

4. Example: quality evaluation of education in high school

Following the tabular model for quality evaluation in secondary education [20], a hybrid model can be built in which sets of quantitative and qualitative indicators are divided into 12 groups (see Table 3). Each group is accompanied by sets of quantitative and qualitative indicators, consistent with the Bulgarian regulatory system [21] (105 in total quantitative and qualitative indicators). Each indicator has its measuring scale (not listed in Table 3). For example, a measurement scale for the quantitative indicator "Teachers with a degree of professional qualification (I, II, III, IV, V)" are the real numbers in the range \[0, 100\] (values of the relative share of the respective category of teachers to the total number of teachers - in percent), and for the qualitative indicator "Use ICT" - the set of values \{definitely "no"; "no" rather than "yes"; neither "yes" nor "no"; "yes" rather than "no"; definitely yes\}.

Table 3. System of indicators for quality evaluation of education in high school (sample).

| Qualitative indicators |
|------------------------|
| 1.1.1. Relevance of the topic of the lesson to the calendar plan. |
| ... |
| 1.1.10. The teacher uses and monitors the observance of the norms of the Bulgarian literary language in the learning process and communication. |

| Quantitative indicators |
|-------------------------|
|                         |
1.2.1. Average numbers of electronic annual calendar plans created by a teacher.
1.2.2. Average number of ICT resources used by a teacher.
1.2.3. Number of interdisciplinary and transdisciplinary lessons conducted.

**Group 2: Educational Activity**

**Qualitative indicators**
2.1.1. Students demonstrate self-discipline and teacher do not have to interrupt the learning process due to problematic behaviour.

...  
2.1.10. Students are encouraged to participate in competitions, camp schools, etc.

**Quantitative indicators**
2.2.1. Number of conducted trainings through guest lecturers.
2.2.2. Number of lessons conducted as outsourced training.
2.2.3. Number of conducted initiatives for civic education /celebration of national, religious and regional holidays/.
2.2.4. Number of excursions, camps, schools in nature.
2.2.5. Percentage of students who participated in excursions, camps, schools in nature.

**Group 3: Learning Outcomes**

**Qualitative indicators**
3.1.1. The assessment motivates students to form knowledge and skills from high cognitive levels (analysis, synthesis, evaluation, critical and creative thinking, etc.).

...  
3.1.9. Parents are informed about the results of the students' assessment.

**Quantitative indicators**
3.2.1. Average result of the students from National External Assessments /NEA/ - the assessment is in real number from 0 to 50 points.
3.2.2. Average result of the students from State Maturity Exit /SME/ - the assessment is in real number from 2 to 6.
3.2.3. Average result of students' participation in Olympiads, competitions, etc., by equating the results as a percentage of the maximum possible result for the specific competition.
3.2.4. Number of the conducted trial exams /NEA and SME/.

**Group 4: Support for Children with Special Education Needs (SEN)**

**Qualitative indicators**
4.1.1. An assessment of the individual needs of the child/student was conducted.

...  
4.1.4. Adapted curricula and learning content, reasonable facilities, technical means, specialized equipment and supportive environment, methodologies and specialists are provided.

**Quantitative indicators**
4.2.1. Number of teams created to provide additional support for students' personal development.

...  
4.2.4. Percentage of students with SEN, attending school, covering state educational standards.

**Group 5: Teacher-student Relationships**

**Qualitative indicators**
5.1.1. The teacher implements activities for the development of teamwork skills.

...  
5.1.6. Classes are held in groups for activities of interest of students.

**Quantitative indicators**
5.2.1. Number of teams created for general support of students.
5.2.2. Number of groups for activities of interest.

...  
5.2.5. Percentage of students participating in activities of interest from STEM.
Group 6: Prevention of Dropping out of the Education System

Qualitative indicators
6.1.1. Identification of students at risk of dropping out and from vulnerable groups.

... 6.1.4. Conducting training in various forms of training /full-time, independent, part-time/.

Quantitative indicators
6.2.1. Percentage of reintegrated students who dropped out of school, from all students who dropped out in the school year.
6.2.2. Percentage of dropped out student.

Group 7: Financial Management

Qualitative indicators
7.1.1. The approved budget and the report on its implementation are published on the school's website.
7.1.2. The pedagogical specialists and the non-pedagogical staff are acquainted with the budget of the school and with the reports for its implementation.
7.1.3. The Public Council has given an opinion on the distribution of the budget by activities and the amount of capital expenditures, as well as on the report on its implementation.

Quantitative indicators
7.2.1. Percentage of the school budget used to improve the physical environment.

... 7.2.4. Percentage of additional funds provided for the development of the school under National programs, projects, etc.

Group 8: Human Resources Management

Qualitative indicators
8.1.1. Clear and transparent rules and procedures for the appointment and dismissal of pedagogical specialists are applied.

... 8.1.4. Clear and transparent rules to motivate and retain non-teaching staff are applied.

Quantitative indicators
8.2.1. Percentage of average annual share of teachers (according to their total number in the school) who participated in international and national programs and projects for professional development.
8.2.2. Percentage of average annual share of teachers (according to their total number in the school) who participated in external institutional qualification of the pedagogical specialists.
8.2.3. Percentage of average annual share of teachers (according to their total number in the school) who participated in internal institutional qualification of the pedagogical specialists.

Group 9: Teachers' Professional Skills

Qualitative indicators
9.1.1. The use of ICT in the learning process.
9.1.2. Pedagogical specialists apply in their direct work the competencies acquired from the qualification activity.
9.1.3. Pedagogical specialists conduct interdisciplinary and transdisciplinary lessons.

Quantitative indicators
9.2.1. Numbers of created teacher portfolios.

... 9.2.7. Average number of qualification credits obtained by teachers
9.2.8. Average number of attended in-school qualification hours

Group 10: Stakeholder Engagement

Qualitative indicators
10.1.1. Communication between parents and other participants in the learning process (head of school, students, pedagogical specialists, etc.)
10.1.4. Contribution of the School Board to the development of the school.

**Quantitative indicators**

10.2.1. Percentage of students satisfied with school management.

...  

10.2.3. Relative percentage of parental satisfaction with school management.

| **Group 11: Facilities** |
|--------------------------|
| **Qualitative indicators** |
| 11.1.1. Provided accessible architectural and physical environment. |
| ... |
| 11.1.5. Actions are being carried out for renewal, modernization and protection of the material base. |

**Quantitative indicators**

11.2.1. Relative percentage of coverage on the territory of the school with wifi network.

...  

11.2.10. Number of service rooms.

| **Group 12: Digitization of Services** |
|--------------------------|
| **Qualitative indicators** |
| 12.1.1. Electronic database for documents need for inspection by NIE. |
| ... |
| 12.1.13. A safe environment is provided when working on the Internet. |

**Quantitative indicators**

12.2.1. Percentage of electronic teacher portfolios.

...  

12.2.6. Percentage of electronic student portfolios.

The model aims to overcome the subjectivity of external evaluation by using a relatively small number, clear and objectively measurable criteria for different types and types of indicators, divided into 12 groups - Teaching Activity (10+3 indicators), Educational Activity (10+5 indicators), Digitization of Services (13+6 indicators), Learning Outcomes (9+4 indicators), Support for Children with Special Education Needs (4+4 indicators), Financial Management (3+4 indicators), Teacher-student Relationships (6+5 indicators), Prevention of Dropping out of the Education System (4+2 indicators), Human Resources Management (4+3 indicators), Stakeholder Engagement (4+3 indicators), Teachers' Professional Skills (3+8 indicators), and Facilities (5+10 indicators). All 132 indicators included in the model (75 qualitative and 57 quantitative) are peculiar measures of the educational process from different points of view - to measure compliance of essential quality criteria with European and national best practices, to objectively compare specific numerical indicators, etc. Qualitative indicators are evaluating by using two types of measuring scales - QS1 and QS2. The first type (QS1) is suitable for such indicators which are used mainly to classify the assessed objects according to a specific characteristic. An example of such a scale is a 5-point Likert scale {definitely "no"; "no" rather than "yes"; neither "yes" nor "no"; "yes" rather than "no"; definitely "yes"}, which can be used in the expert assessment of the presence (or not) of specific functionality of an object. The second type of measuring scales (QS2) are suitable for indicators, the values of which are used to compare the qualities of objects. An example of such a scale is the set {2, 3, 4, 5, 6}, used in the educational system as a scale for indicators measuring the students' knowledge in a given discipline. In such cases, a higher value of the indicator is considered as a sign for a higher quality of the evaluated object. The proposed hybrid model for quality evaluation of the secondary school uses 4 measurement scales, based on relative measurements of 56 quantitative indicators (e.g. total number, average number, relative number).

Based on the proposed system of criteria (groups) and indicators, the quality evaluation of education of a group of secondary schools can be carried out in 8 stages.
Stage 1. The evaluating body (EB) publishes the model (criteria, quantitative and qualitative indicators, scales for their measurement) and the evaluation methodology, incl. templates/forms and instructions for their completion;

Stage 2. Each school fills in the template values of the quantitative and qualitative indicators of the model accompanied by evidence (in the form of a self-evaluation report);

Stage 3. EB monitors the presented forms (sets of values and evidence);

Stage 4. Public access to the self-assessment forms with the possibility for comment and notes is provided;

Stage 5. There is feedback from the EB with each evaluated school to eliminate gaps and errors found in Stage 3. in the presented forms of self-evaluation;

Stage 6. The methodology (calculation procedure) for quality evaluation of education in high schools based on the sets of quantitative and qualitative indicators is applied, and a rating of the evaluated object is compiled (an example of such methodology is presented in Section 3);

Stage 7. Public access to the results of the evaluation procedure is provided;

Stage 8. The results of the evaluation procedure are analysed to improve the evaluation model.

5. Conclusion

A model for quality evaluation in secondary education is proposed, based on a set of qualitative and quantitative indicators, compliant with the Bulgarian regulatory framework for secondary education. The model has been developed after analysing the state of the art in the field. The ultimate goal of the study is to find solutions to problems P1 and P2 in quality evaluation of education in secondary schools and to create preconditions for their automated solution.

The advantages of the proposed hybrid model are its following characteristics:

- the subject of evaluation are results of conducted policy and activities rather than formal features (presence or absence of school attributes and events);
- the subject of evaluation are qualities of outcomes of the respective activities rather than their presence or absence;
- the model is invariant in terms of the criteria used and can evolve (relevant groups and sets of indicators, as well as their weights, can change without the need for a change in the evaluation methodology);
- it is possible to use different methods for forming a general assessment of the quality of the educational site based on the values of the indicators;
- the evaluation methodology can be defined as hybrid (based on expert evaluations of qualitative indicators and objective quantitative indicators, supported by evidence), multilevel (with a division of responsibilities for evaluation and control at different levels) and formalized (suitable for automation);
- the model (and the specific system of indicators) correspond to European practices and quality standards of secondary education.

The model can be used as a good basis for building of model for the needs of each secondary school in Bulgarian. The proposed hybrid model will be verified in chosen secondary schools in which there are no trained quality experts. Based on results of the verification, the model will be improved and enriched with new indicators which meet the needs of school.

The following studies in the field will be focused on:

- experimental application of the hybrid model for quality evaluation of various objects of secondary education;
- analyses of the results of the experiments, especially concerning the adequacy of the used criteria and indicators;
- study of the specifics of the evaluated objects to further develop the proposed general model, etc.

Based on the results achieved, the next studies can go on towards the creation of:
• methodology for forming a comprehensive assessment of the quality of education in secondary school (based on sets of criteria, quantitative and qualitative indicators for different types of objects);
• a package of software tools for forming numerical assessments of groups of secondary schools;
• national system for dynamic quality monitoring in secondary education.

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