
УПРАВЛЕНИЕ ОБРАЗОВАНИЕМ

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A PSYCHOMETRIC STUDY: THE VALIDATION OF A SCHOOL QUALITY ASSESSMENT TOOL

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Abstract. *Introduction.* School evaluation is a complex process, and it is now a central priority for education systems with varied practices and multiple actors. It affects many aspects: teachers, institutions, training, management, educational policies, and design. Thus, it is necessary to think first about the regulation of the indicators that will serve as a system of valuation/sanction of the quality measured.

Aim. The present research *aims* to construct a grid for evaluating pedagogical and administrative quality of secondary school. Furthermore, producing a quality evaluation system based on indicators to allow quality to be witnessed remains a challenge. We have optimised and validated a coherent evaluation system of indicators (School Quality Assessment System SEQES). It is based on rigorous scientific research, evaluating school quality and testing with 196 stakeholders (school administrators, teachers, educational inspectors, and planning).

Research methodology and methods. The design and validation of this evaluation grid were carried out based on Churchill's (1979) theory of measurement with a methodological process of numerous steps of analysis and emergent categorisation of items, scaling, refinement, and field testing.

Results and scientific novelty. The exploratory factor analysis (EFA) was administered to 196 stakeholders and initially yielded 153 items from 289. They articulated qualitative steps (interviews with members of audit cells, techniques: Focus Group, TGN, TRIAGE) and quantitative (Exploratory Factor Analysis). The results made it possible to identify a scale of seven dimensions and fields of 37 items, considering theoretical, empirical, and methodological considerations.

Practical significance. This measurement instrument is a toolbox that can be developed for decision-makers to establish a reference system for systematic external quality evaluation at the national level and a toolkit for inspectors and headteachers.

Keywords: validation, evaluation, optimisation indicators, school quality, psychometric study.

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ПСИХОМЕТРИЧЕСКОЕ ИССЛЕДОВАНИЕ: ВАЛИДАЦИЯ ИНСТРУМЕНТА ОЦЕНКИ КАЧЕСТВА ШКОЛЬНОГО ОБРАЗОВАНИЯ

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Аннотация. Введение. Оценка школьного образования является сложным процессом, и в настоящее время это один из центральных приоритетов в системах образования с различными видами практики и многочисленными субъектами. Она затрагивает многие аспекты: учителей, учреждения, обучение, управление, политику в области образования и дизайн. Таким образом, необходимо сначала подумать о регулировании показателей, которые будут служить системой оценки/санкционирования измеряемого таким образом качества.

Цель. Основная цель – построить шкалу для оценки педагогического и административного качества средних школ. Построение такой системы на основе показателей, которые позволили бы засвидетельствовать качество, остается сложной задачей. В этом контексте авторы оптимизировали и утвердили последовательную систему оценки показателей (Система оценки качества школы – SEQES), основанную на строгих научных исследованиях, оценивающих качество школы, и провели эксперимент с 196 участниками и исходными лицами (администраторы школ, учителя, педагогические инспекторы, представители руководства и отделов планирования).

Методология и методы исследования. Разработка и утверждение данной оценочной шкалы осуществлялись на основе теории измерения Черчилля (1979) и методологического процесса, состоящего из многочисленных этапов анализа и эмпирической категоризации пунктов, шкалирования, уточнения и полевого тестирования.

Результаты и научная новизна. В исследовательском факторном анализе приняли участие 196 заинтересованных лиц, и первоначально он дал результаты по 153 пунктам из 289. Сформулированы качественные этапы (интервью с членами аудиторских ячеек, методики: фокус-группа, TGN, TRIAGE) и количественные (исследовательский факторный анализ). Результаты позволили определить шкалу из 7 измерений и полей из 37 пунктов с учетом теоретических, эмпирических и методологических принципов.

Практическая значимость. Эта оценочная шкала является инструментарием, который может использоваться для создания эталонной системы для систематической внешней оценки качества на национальном уровне, лицами, принимающими решения, а также инспекционными органами и руководителями учебных заведений.

Ключевые слова: валидация, оценка, оптимизационные показатели, качество школы, психометрическое исследование.

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Introduction

The concept of quality based on benchmarks remains very diverse and problematic. It is present in our daily life and different sectors: economy, industry, health, psychology, sport, and education. Quality arises as a significant concern in various sectors of each country to ensure the performance of either the organisation or the staff as confirmed by Bowe, Dayan, Karatepe, Machado, Roussiau, Talbott [1–6].

The literature review we consulted highlighted the importance and growing interest of research on the topic [7, 8]. Indeed, the Organisation for Economic Co-operation and Development OECD (2018, 2016, and 2004) has published the performance of the quality of education of countries (European, Anglo-Saxon, and developing countries). However, their assessments leave much room for controversy. Institutional data, country-specific indicators, and the culture of education system evaluation are lacking, as indicated by Dahler-Larsen [9].

Adding also the lack of national evaluation reference with elements to measure the quality of schools in some developing countries, as pointed out by Maghnouj [10]. This lack of a system clashes with national identity and cultural and religious sensitivity, as Billing and Van Damme [11, 12].

The current concept of quality is still confusing due to the lack of a consensual definition. Anglo-Saxon countries are the pioneers in discussing the idea of quality.

Quality is always a concern in education because the educational sphere contains both the beneficiaries (pupils and students) and the actors (teachers and administration) who provide this service, which is constantly growing. We do not manage to ensure quality in schools and universities, and then there is a risk of dropping out of school and university. Faced with this challenge and the high demand for quality, secondary schools must develop quality measurement strategies with reliable and valid instruments.

The school environment attracts more interest and growing demand for excellence and quality in its structures. Since the beginning, the school institution has offered services (education and teaching-learning). Primarily a service intended and oriented to quality requires the performance of methods of evaluation of the activities of this service. And given that the assessment of the quality of services relies on the judgments of stakeholders who have different perceptions of quality within their schools. Thus, a need for a service quality measurement model remains. Ramseook-Munhurrin has indicated a growing body of research to develop measurement scales to extract this multidimensional construct of school quality (five dimensions: school facilities, reliability, responsiveness, empathy, and assurance-discipline) [13]. Riahi and Ghaicha are focused on quality in higher education [14, 15]. The Ministry of National Education in Morocco has made several attempts to develop a national plan to establish a quality system. In addition, the country is committed to enhancing quality in education through a Strategic Vision of the 2015/2030 reform [16], developed by the Higher Council of Education, Training, and Scientific Research (CSEFRS), in chapter 2, lever 9 "For a quality school for all" and "Renovation of teaching, training and management professions: the first condition for quality improvement". Such a strategic choice remains complex given the complexity of the sector.

Based on the epistemological and methodological considerations, we will attempt to determine the descriptors of school quality. Thus, our goal through this study is to develop and validate a scale for measuring and evaluating school quality in Morocco.

This research aims to answer the following questions:

- To define what the methodological approach to building and validating a school quality assessment tool;

- How to establish as complete a list as possible of indicators that could measure the quality of the organisations concerned;

- And what methodology should be applied to rank these indicators according to their relevance and reliability.

These questions are among an indefinite list of concerns of instructional designers, listeners, and researchers. We focus our study on these issues.

We will test the following hypotheses:

- H1: Quality in educational institutions is a multidimensional construct with several dimensions.

- H2: The perceptions of the actors on the quality of the schools are identical and convergent.

- H3: Management, administrative management, and teaching practices are two dimensions measuring the quality of schools.

Literature Review

Significant growth of studies recently focuses on quality in education, especially in higher education, which takes an important part. Badran et al., Hildesheim, Kohoutek, Ntim, and Sattler investigated the link quality assurance and quality culture, total quality management (TQM), and its indicators (especially in emerging or developing countries) [17–21]. Gunawan and others are developing tools to measure students' perceptions of their future employability [22] or the quality of student-faculty relationships. However, Huson, Shah et al. have not developed empirical approaches [23, 24]. In addition, with his research, Karaca established measurement scales on specific and regional issues within the institution of higher education such as the psychometrically valid instrument to measure the demotivation of male and female students in English writing in Turkey [25]. However, this instrument that follows the approach and suggestions [26] remains criticised as indicated by the results of DeVellis, or with the tool to measure the sustainability and quality of services in Turkish universities [27]. Abdullah conducted to validate and build a measurement instrument based on already existing models in the literature that allows extracting and confirming the dimensions of quality in higher education institutions [28].

The studies conducted by Arribas Díaz, Detert, Soria-García et al. are undertaken to validate and build a measurement instrument based on models in the literature that allows extracting and confirming the dimensions of total quality (TQM) in secondary schools: the leadership of the institution, a key element [29–31] or the field of values, curricula and the structural aspect of the institution. However, it has remained limited to the restricted actors (teachers

and administrators and the number of integrated institutions) [32]. In multiple studies cited, the parameter of developing tools based on actors' perceptions (students, teachers, administration) or even on the quality of relationships (students/professors) [33]; remains very common for studies on higher education but controversial, as confirmed by Snijders et al.

On the one hand, the link that emerges between the quality of the service and the actors' perception, and on the other hand, the gap between the perception and the expectations is considerable. In contrast, its parameters are deemed suitable for integration into education according to Heo, Ramseook-Munhurrun et al. [34, 35], criticisms are often injected by transposing quality assessment tools from the commercial and industrial realm onto practices measuring quality in a complex public institution such as the school (multiple stakeholders and objectives) [36].

Indeed, some measurement scales are sufficiently methodologically approved, valid and reliable. However, most quality measurement instruments are based on theory rather than empirical criteria, tools containing criteria-based grids, or questionnaires that have not been subjected to validation tests of their internal structures and confirmation tests.

This is the case for many research works in the literature that have analysed the same institution as the one targeted in our research (secondary schools), as indicated by Silva and Sweis et al. [37, 38].

Furthermore, Gronroos reports that developing a measurement scale with indicators that would allow quality to be measured remains a methodological field that needs to be exploited because the dimension of quality measurement differs according to the latter's nature and its environment [39].

Furthermore, we consider that service quality is relative to the field of activity considered. Quality measurement in schools remains very limited and embryonic, as few measurement scales have been developed and deemed relevant with well-defined psychometric characteristics (valid and reliable).

In this regard, research has developed measurement instruments through experts, a literature review to select the tool in the literature, a critical review of the literature, a qualitative approach based on the perception of actors (administrators, teachers) [40], and a quantitative one based on correlative statistical factor analysis. Nevertheless, the validation steps remain highly questionable, as each study readapts them according to the particularity of the context. In this sense, the paradigm of Churchill, 1979, is one of the models that researchers often use and have allowed to validate measurement scales and justify the validity and reliability with straightforward steps.

According to Domínguez, the research carried out is only interested in specific areas of education within secondary schools and the development of measurement tools related to the classroom climate of the secondary school [41].

Also, Gaudreau et al. reported teachers' sense of self-efficacy in classroom management [42]. A survey tool that incorporates the measurement of traditional bullying and cyberbullying among students in the school and not the quality of the school structure as confirmed by the authors, Cheng and Saitoti [43–45]. The school system (secondary school) remains less common and opens up research prospects for developing measurement scales [31].

Undoubtedly, researchers and practitioners mark their originality with indicators and parameters measuring quality. Still, these are limited and not exhaustive [45], linked to the context, culture, and actors according to Kasetwar [46], which can leave criticisms regarding the instrument's psychometric characteristics, validity, and reliability. Although it is observed that measurement tools adopt different methods, the critical parameter related to the opinion of experts and their contributions in the validation process of the measurement instrument remains a common and unavoidable parameter in almost all the studies consulted on the subject.

The history of quality is intimately linked to the development of organisations. It covers the primary, secondary, and tertiary domains. Like all the techniques that have been developed during this century, the concept of quality has not stopped evolving. Indeed, the idea of product and service quality was formed after the Second World War to overcome the ravages of Taylorism. In 1994, this concept was standardised within the framework of the ISO 8402 standard under the term "Total Quality Management". This evolution resulted from the competition between the West, which initially invented the theories concerning quality. Thus, it has allowed the emergence of several approaches and the development of male Maroc management methods.

Faced with the phenomenon of globalisation of regional and international grouping, Morocco is obligated to participate in the movement of quality and integrate it as a dimension in its strategic vision. The quality movement has appeared in different countries and at other times. However, the quality movement has different orientations.

From our systematic point of view, and as confirmed in Collignon's study, the concept of quality has a multidimensional character. It integrates the human, strategic, financial, commercial, educational, organisational, and technical dimensions [47]. These dimensions make it possible to trace the general approach to quality and thus to clarify this concept. It is an open system approach where the inputs are the needs of the clientele and the quality offered by the competitors. At the same time, the outputs are the technically and economically adapted products and the information on the product performance.

The term "quality" is very used in the education sector, especially in developing countries, gives the illusion of an easy definition. The reflection on all

aspects of this concept is required. We will end up facing its ambiguity and the difficulty of giving it a precise definition, sometimes due to lack of materials in some schools, lack of infrastructure, or even lack of human resources in regions far from the city centers. Despite the exploitation of works and research made in this field, it is difficult to find a universal definition, for the simple reason that the notion “quality” concerns several areas and that each one starts from its field of activity or interest, in addition to the involvement of many actors in the implementation of a quality assessment system in schools.

Despite the attempt by the Ministry of Education to set up a draft national quality assessment framework, there is still the lack of standards and national references evaluating the quality in schools in developing countries such as Morocco (qualifying and college). Thus, the analytical report (December 2014) of the National Instance of Evaluation of the System of Education, Training, and Scientific Research (INE) has not succeeded in setting up a system of evaluation of the quality of schools with all its dimensions.

The analysis of the literature review and the attempts to develop and validate instruments measuring service quality in secondary education institutions reveal a little-explored territory compared to higher education. Most of the research studies on service quality were mainly focused on quality assessment its perceptions [37]. In this perspective, we consider that the tool for measuring the quality of educational institutions must be systematic and comprehensive with indicators that affect both the organisation and management of the institution and the relational pedagogical aspect of all actors within it.

The objective is to validate and develop an instrument for measuring and evaluating the quality of the management and organisation of secondary schools to help them improve the quality and success of the leadership within their educational institutions.

Methodology

We recall that our objective is to develop and validate a quality measurement tool relative to a context that is not very touching: schools and fill in the gaps and inadequacies of the measurement tools in the literature review. This study identifies as many dimensions as possible across all stakeholders and actors in schools. To do this, we adopted Churchill's (1979) validation model with all its steps [48].

1. Construction of the Corpus of Items

For our study, the actors first had to understand the dimensions and their facets of this reflection. They could find lists of indicators through a focus group

to explain the issue and the general context of the study. Each group member was then invited to propose up to five indicators for each of the facets identified in the previous step. Themes by the leaders grouped the proposals of each, that is to say, according to each dimension and their aspects, given a meeting during which each piece will be analysed individually by the “expert group”.

This is a phase of item clarity, the objective of which is to identify the raw quality-determining items as a first step by adopting two main methods for the identification of credible quality indicators of potential interest: meetings with field specialists, i.e. the various actors who are in direct contact with schools, and a review of the relevant literature to establish the state of the art of available indicators in the field of education and teaching. In addition, to prepare the questionnaire for the actors, whose seniority varies between one year and 30 years, based on a simple form with a single nominal question in two languages (Arabic and French), we did not include the financial aspect, and we focused our research on the administrative and pedagogical aspects.

The survey was carried out using non-directive interviews, the form of which consists of a single key question, from which the actors are asked to list the statements they consider essential on indicators related to the theme: “What are (in your opinion) the indicators that reflect the pedagogical and administrative quality at the level of schools (secondary cycle)?”.

2. The Participants in the First Exploratory Study

Given the scope of the research and the issues at stake, transposed to the educational sector, the rigor required by the chosen model, and given the means available and the constraints of the field, we contacted by telephone and by direct meetings with the 210 actors (principals: 62, inspectors: 40, administrators of the provincial directorates and Regional Academies of Education and Training AREFs: 28, teachers: 80), others we asked for an appointment to interview with them. In order to obtain a favourable response rate, we confirmed the anonymity of their comments. In the end, we succeeded in identifying with them the list of raw items in the same period.

This research was carried out in three (03) Regional Academies of Education and Training: AREF of Oriental, Fez-Meknes, and Rabat-Salé-Kenitra, a group responsible for the protocol and process of the research composed of inspectors-trainees of the Training Center of Education Inspectors in Rabat.

Once the data had been collected, we submitted them to focus groups in different locations (the three pilot AREFs: Oriental, Fez-Meknes, Rabat-Salé-Kénitra), and through two stages: the raw items proposed are in both French and Arabic, which leaves us with another dilemma. However, we translated the articles in Arabic into French, including that the meaning of the item sentences

remained the same; we resorted to pedagogical inspectors and professors of the French language to establish reliable and valid lists of translated items.

The results of these analyses allowed us to identify the items with filtering and grouping of those that have the same meaning and a cross-referencing and a confrontation of all the statements and results raised.

More than 289 raw items were proposed during the individual production of the actors, and we eliminated and reformulated 32 things that have a general aspect (not measurable), and also grouped some items that have the same linguistic concentration during a preliminary qualitative phase, the raw statements are related to the dimension of measuring quality in schools. This step was followed by a purification of the comments by focus groups composed of teams of pedagogical inspectors in training and experts in auditing at the level of the regional academies of education and training (AREF of Rabat-Salé, Fez-Meknes, and the Oriental).

Secondly, another analysis established categories as the items were read and assigned to their types and fields. This step was adopted by the research team to eliminate vague, general statements and to reformulate those that required more precision. At the end of this work, which took place over two successive days with meetings lasting half a day each, the team was able to add to the list of new indicators that it considered relevant and usable for each criterion and each field relating to it.

3. Emergent Item Analysis and Categorisation

The results of the qualitative analysis made it possible to identify a total of more than 157 raw indicators that the participants proposed during the individual production. Subsequently, they were based on 154 hands and classified into seven criteria. This grouping was carried out beforehand by those in charge of the research; coming from the consensus of the qualitative approach in consultation and the light of the workshops carried out by the groups of experts (regional units of the AREF of Oriental and Rabat-Salé-Kenitra). To proceed to this criticised categorisation, we had called upon the DELPHI technique, studied and reviewed by Helmer [49] at the Rand Corporation. This choice is justified because it allowed us to probe the priorities perceived by the members of the participants, avoiding the confrontation of their suggestions and their words within the group in the study conducted by Nunnally [50].

4. Exploratory Scale Analysis Procedures

This exploratory factorial analysis consists of administering all selected items with a five-position Likert scale. Finally, a scale is assigned to each indicator to measure things or specific and observable characteristics of the critical

concept representing the general objective, i.e., for this study, identification of indicators measuring the pedagogical and administrative quality of schools (secondary cycle). Thus, a relative weighting is assigned to each dimension and indicator.

The approval rule for the key indicators was a progressive scale, graduated from 1 to 5, corresponding respectively to (1) None (or non-existent), and (5) Existing and operational. Adding also that for each criterion (theme) that groups a determined number of items, or resource persons who will respond to this questionnaire, have the opportunity to suggest other things that will be considered essential and not included in the list of items that form the questionnaire. These suggestions were also collected and analysed using a qualitative approach.

This questionnaire was pre-tested with five educational inspectors, ten teachers, and two principals in the second cycle to ensure clarity and understanding. It has been constituted to validate the indicators that did not reach consensus in the previous version.

To achieve this critical phase, we elaborated this questionnaire in two versions: a paper version of six pages, distributed to the actors, and an electronic one through the "Google Forms" ticket. On the one hand, this choice was justified because of the diversity of the target actors of our research, who have daily concerns and commitments, and on the other hand, this choice was made, given the time constraint.

The sample comprises 400 actors in the field of education and training; after follow-up procedures, we obtained 196 usable responses, i.e. a response rate of approximately (50%). All the participants volunteered for the study (174 men and 22 women), corresponding to a percentage of (88.8%; 11.2%), whose years of experience ranged from one year to 38 years, whose framework and status was different, 110 (56.1%) of the respondents were administrators (35.2% of the principals, 18.4% of the external supervisors and censors of institutions, and 86 teachers [43.9%]).

We administered (as an alternative) the questionnaire through the hierarchy and officially through a regional note sent by the division of pedagogical affairs of the Ministry of Education to the AREFs, or by telephone and mail to obtain the maximum number of responses.

5. Method of Exploratory Factor Analysis of the Scale

Fidelity analysis method

The scale's internal consistency is tested by the split-half method [50]. While internal consistency is achieved by Cronbach's alpha coefficient [51, 52], a threshold of 0.7 is considered very acceptable. We re-examined the same indices after eliminating the items whose skewness and kurtosis coefficients are

more significant than ± 1 and whose factorial exploratory analysis (EFA) factorial saturation coefficient is less than 0.4.

Exploratory factorial analysis method

According to Costello, exploratory factor analysis was used to identify latent factors from the measured variables [53].

The factor structure was examined using SPSS V26 software, using the “Maximum Likelihood” extraction method with rotation of the axes (Varimax), assuming moderate inter-factor correlations [54]. It thus makes it possible to study the factorial structure of the data collected without reference to predetermined dimensions. We retained the maximum number of interpretable factors, whose eigenvalue is greater than 1, and Guttman indicated that explained variance is greater than or equal to 50% [55].

The indices used in the factor analysis are the KMO (Kaiser-Mauer-Olin) index and the determinant of the correlation matrix. These are two indices showing the existence of correlation patterns between the scale items to be validated according to Bourque and his collaborators [56]. A saturation coefficient is greater than 0.40 allows us to retain the items on the factor.

We chose the method of extraction of ULS with OBLIMIN rotation. The latter is recommended when ordinal scales, non-normal item distributions, and factors likely correlated with each other are present.

The factor structure was examined in SPSS 23 using the Maximum Likelihood extraction method with Varimax-type rotation of the axes assuming moderate inter-factor correlations [57], making it possible to study the factor structure of the data collected without reference to predetermined dimensions. We deliberately retained the maximum number of interpretable factors.

To explore the structure of the school quality assessment scale, we conducted an exploratory factor analysis as it confirmed Hurley et al., which is recognised as appropriate when testing scales under construction [58].

Results

1. Exploratory Factorial Analysis

Table 1 shows the KMO (Kaiser-Mauer-Olin) index measure and the determinant of the correlation matrix. The value found is 0.82. It is well above the recommended threshold (0.70). Our items thus present relatively compact correlation patterns, allowing us to distinguish clearly [59]. The determinant of the correlation matrix (DMC) represents a relatively small value (0.004) but not zero. It is well within the norm.

We used rotations. The Kaiser, Meyer, and Olkin (KMO) test and the Bartlett test of sphericity allowed us to factor in the data or not. Our scale

complies with this requirement (Kaiser-Meyer-Olkin (KMO) = .828; and Bartlett's Sphericity Test: 11175).

Table 1

The resultant factor structure (Kaiser-Meyer-Olkin Index; and Bartlett's Test)

Indexes		SEQES
Index of the Kaiser-Meyer-Olkin sampling quality measure.		,828
Bartlett's sphericity test	Approximate Khi-square	27746.934
	DDL	11175
Meaning of Bartlett		,000

The results of the AFE show 07 factors forming the SEQES school quality scale; the eigenvalue was more significant than 1 [55]. These 07 factors explain 79.500% of the total variance. Gorsuch confirmed a good proportion [60], with eigenvalues exceeding 1. Thus, the factorial matrix represented in Table 2, summarises the factor loadings for each item.

From this point of view, the results showed that, after a first factorial analysis (153 items), we kept only 07 factors and 37 things, with variance values exceeding 1, and eliminated indicators (items) that have factor loadings lower than 0.4 (< 0.4 in the component matrix).

We proceeded from a second data collection to the purification and validation of our measurement scale. A principal component analysis (PCA) was carried out on the same sample of items, from which the factorial study was able to identify 65 items: with the elimination of 28 items.

Factor 1 explained 18.981% of the total variance and consisted of eight items assessing the overall organisational climate within the facility (OC).

The second factor is also composed of five items evaluating the Operational Action Plans for the productive performance of the facility (AP). It explains 17.462% of the total variance.

The third factor comprises four items reflecting the quality of supervision and support (EA). It explains 15.577% of the variance. And it includes five things.

The fourth factor includes eight statements related to the quality of management of resources and working conditions (GRT). It concerns the characteristics of the working conditions within the school. It explains 9.368% of the variance.

The fifth factor explains 9.354% of the variance. It includes four items assessing the competencies of the stakeholders working in the school (CI).

The sixth factor (LO) includes three items related to organisational leadership in teaching. It explains nearly 5.795% of the variance.

The seventh factor is formed by four items, all dealing with the school's internal institutional performance and outreach and its students (IR). It has a value that explains 2.963% of the variance.

Table 4 represents the eigenvalues, and total variance explained for each factor identified by the exploratory factor analysis (EFA).

Table 2

Factors matrix after scale rotations and total explained variance of each one

Item abbreviation ¹	7 Factors explaining 79,500 %						
	F1 (CO)	F2 (PA)	F3 (EA)	F4 (GRT)	F5 (CI)	F6 (LO)	F7 (RI)
Contribution	18,981%	17,462%	15,577%	9,368 %	9,354 %	5,795%	2,963 %
CO06	.873						
CO09	.865						
CO03	.829						
CO01	.777						
CO04	.769						
CO02	.749						
CO08	.742						
CO07	.710						
PA05		.888					
PA04		.864					
PA06		.824					
PA03		.691					
PA01		.628					

¹CO06: The actors of the establishment adhere to the management project of the establishment. CO09: The school is always attentive and responds to questions and requests for information from internal and external stakeholders. CO03: Involvement in school life. CO01: Active Clubs. CO04: Motivation of the school's human resources. CO02: Strengths and Weaknesses of the School. CO08: Teachers adopt a positive attitude towards their students. CO07: Tracking and control of absenteeism of the actors (administrative body and teachers). PA03: Stakeholder needs and expectations sheet (administrators, teachers, students, and other staff). PA01: The planning and project of the school available and operational. PA04: A communication plan of the school with its environment. PA06: The school has an internship promotion project based on the results. PA05: Creation of partnerships with foreign institutions, civil society and local authorities. EA05: Contribute to educational and administrative activities. EA07: The realisation of the continuous controls is regular according to the requirements of the official marks. EA06: Controlled text books. EA01: Attendance and reduction of student absences. EA03: Respecting learning time. GRT03: An adapted site of the school. GRT07: The establishment has sufficient spaces (green and open), and sports facilities. GRT04: The gate of the school opens on the secure area. GRT06: Mechanism of the Service for the maintenance of the facilities of the school sanitary installations. GRT08: Independent financial resources. GRT01: The school has sufficient human resources, proportional to the number of students (teachers and general supervisors). GRT05: The school has classrooms proportional to the number of students. GRT02: Integration of new computer technologies in education. CI03: Cumulative experience of the actors. CI02: Mastery by the teaching staff of didactic and pedagogical innovations. CI01: The degree of adoption of foreign languages throughout secondary education. LO03: Charter for social action. LO01: Rate of Complaint handling in coordination with facility stakeholders. LO04: Search for solutions for cases of lateness and absenteeism. RI01: Annual school action plans based on measurable and achievable goals. RI06: Establishment of international streams in the school. RI04: Flow rate. RI05: Graduate school integration rate 50 % of graduates.

EA03				.585			
EA07				.517			
EA01				.507			
EA06				.499			
EA05				.432			
GRT05					.796		
GRT02					.790		
GRT04					.729		
GRT07					.689		
GRT06					.660		
GRT01					.628		
GRT03					.614		
GRT08					.505		
CI04						.646	
CI03						.613	
CI01						.517	
CI02						.469	
LO03							.648
LO01							.604
LO04							.569
RI01							.513
RI04							.476
RI06							.458
RI05							.419
Explained variance	18,981 %	17,462%	15,577 %	9,368 %	9,354 %	5,795%	2,963 %
% Cumulative Variance	18,981	36,443	52,02	61,388	70,742	76,537	79,500
-Attempt to extract 7 factors. Convergence of the rotation in 6 iterations. (Convergence = 0.017).							
-Extraction method: Principal component analysis with maximum likelihood.							
-Rotation method: Varimax with Kaiser normalisation.							
-Coefficients of items below 0.40 are eliminated and not considered for our measurement scale.							

2. Scale Reliability Analysis

Based on the exploratory factor analysis results, the new version of the Quality Assessment System for Schools SEQES scale has 07 dimensions measuring school quality. We examined the internal consistency and the internal coherence of the seven subscales. We re-examined the same indices after eliminating 28 items with Kurtosis and Skewness coefficients more significant than ± 1 and with a factor loading of less than 0.4 in the AFE [61]. The results are presented in Table 3.

After eliminating the 28 items, the internal consistency value expressed as Cronbach's Alpha increased from 0.716 to 0.887. Similarly, the importance of internal consistency, defined by the correlation coefficient, improved from 0.692 to 0.869. Thus, all the values of the seven subscales improved well beyond the threshold of 0.70 set by Nunnally [50] and recommended by Clark, Van Maele et al. [62–64]. Moreover, like Field some researchers argue that an alpha greater than or equal to .80 reveals good internal consistency.

Table 3

Characteristics of the internal consistency and coherence of the scale SEQES

Subscales	Code	Number of items			Correlation between the 2 parts ^b		Cronbach's Alpha ^c	
		Raw items	Items removed ^a	Retained items	Before	After	Before	After
Organisational climate	CO	11	03	08	0,713	0,887	0,753	0,890
Operational Action plans (productive performance of the school)	PA	06	01	05	0,689	0,828	0,712	0,883
Framing and accompaniment	EA	07	02	05	0,643	0,861	0,706	0,876
Resource management and work conditions	GRT	16	08	08	0,601	0,805	0,740	0,860
Stakeholder skills	CI	12	08	04	0,587	0,631	0,672	0,779
Organisational leadership	LO	07	04	03	0,598	0,790	0,651	0,684
Institutional internal performance and leadership	RI	06	02	04	0,560	0,776	0,615	0,701
Échelle	SEQES	65	28	37	0,692	0,869	0,716	0,887

a. Items eliminated outside the ± 1 range of the skewness and symmetry coefficient or saturation coefficient below 0.4 in the EFA

b. Internal consistency coefficient.

c. Internal consistency coefficient.

3. Analysis of Inter-Factor Correlations

The correlations between the 07 factors of the SEQES scale are presented in Table 4. Thus, out of the 21 correlations calculated, we obtained 16 significant coefficients, i.e. 76.20%, but medium intensity.

Table 4

Correlation matrix between SEQES factors expressed in terms of Bravais-Pearson coefficient

Factors	CO	PA	EA	GRT	CI	LO	RI
Organisational climate CO	1						
Operational action plans (productive performance of the school) PA	.821*	1					

Framing and accompaniment EA	.639**	.791*	1				
Resource management and work conditions GRT	.608**	.888**	.761**	1			
Stakeholder skills CI	.601**	.641*	.0748	.0802*	1		
Organisational leadership LO	.572	.262*	.0649*	.713**	.0537	1	
Institutional internal performance and leadership RI	.364	.493	.510**	.322*	.817**	.0751*	1

*: significant correlation always in -1 and +1, the closer to -1 or +1, the more intense the correlation

4. Analysis of the Conceptual Validity of the Scale

We completed the research process to verify the construct validity of the seven dimensions raised. We identified for each factor of the scale a theoretical basis of research and studies existing in the literature (Table 5).

Table 5

Analysis of the scale construct validity through the studies

N	Factors	Authors/Studies
1	Organisational climate CO	Managerial and organisational culture [20]; the environment within the school structure [39].
2	Operational action plans (productive performance of the school) PA	The vision of this structure and the duties and values [30, 40].
3	Framing and accompaniment EA	Teacher-student relationships and role in school support [64]; Principals' and teachers' perceptions of school quality improvement meet students' needs [40].
4	Resource management and work conditions GRT	Physical resources [13, 65]. The structural aspect of the establishment [30].
5	Stakeholder skills CI	Teacher involvement[66–68]
6	Organisational leadership LO	The school's leadership and the strong involvement of the administrators [31]; leadership as one of the criteria for measuring total quality management [65, 69]
7	Institutional internal performance and leadership RI	

Discussion

The main objective of this study was to develop and validate a multidimensional measurement device to evaluate the quality of secondary schools optimised and adapted to the context of education in Morocco. Our study presents specific characteristics from which the relevance lies, on the one hand, that it approaches the structure of the school of the secondary cycle qualifying with the various facets which constitute its performance and its quality. On the other hand, it covers multiple dimensions of the measurement of the quality of an educational organisation such as schools which remains very little touched by the studies of validation of the scales of measurement.

The design and validation of this measurement and evaluation scale are based on a methodological approach related to the classical theory of scale validation through the Churchill paradigm (1979). Several authors, adopted this approach, such as DeVellis, and Roussel [70, 71]. In addition, our study is based on the theory of measurement that is increasingly explicit [72].

The study that we have carried out has a twofold purpose: firstly, to find an approach and procedure to follow, and, secondly, to find a methodology. It is a question of how to build a system of quality indicators in the Moroccan context with all its particularity, whose goal would be to measure the state of quality of the school of the secondary cycle. Secondly, to answer the question of how to ensure that the system of indicators is optimal, to enable us to draw a picture of the quality of the school. And to do this, we proceeded with a long and rigorous process, with the stages of construction of the corpus of items, analysis and emergent categorisation of items, expertise, and evaluation of the format of the tool. This research was conducted in three (03) Regional Academies of Education and Training: AREF of Oriental, Fez-Meknes, and Rabat-Salé-Kenitra of the Kingdom of Morocco. Our study involved 210 stakeholders, including school principals, inspectors, administrators of provincial directorates and AREFs, and teachers. Our sample size is acceptable, and these results agree with the findings by Hair and Lagrosen [73, 74]. Ultimately, our goal is to test the scale with the selected sample and not generalise the results to the population.

Although our methodological approach aligns with the processes and principles of constructing and validating measurement instruments, it did not include all the school quality factors, as some determinants are difficult to extract due to the difficulty of measuring, verbalising, or personal items.

By analysing the reliability and validity indices, we confirmed and verified the methodological quality developed by Newton [75]. In this respect, the exploratory factor analysis AFE allowed us to extract and highlight seven factors forming the SEQES scale of school quality. These seven factors explain 79.500%

of the total variance. That is a fair proportion [73], given that the threshold for retaining the number of factors generated is at least 60% explanation of conflict reported by Guttman with eigenvalues exceeding 1 [55]. The factorial structure carried out made it possible to keep only the items having coefficients of saturation higher than 0.4 and eliminate all the other things that do not meet this requirement. And still, in terms of semantic consistency, the KMO index reaches a good value that exceeds the recommended threshold of 0.70. In addition, the analyses of internal consistency and internal coherence are expressed by Cronbach's Alpha with a high value of 0.887. This value is considered good in the literature by Nunnally [50].

To answer the question regarding the reliability and validity of our SEQES measurement scale, the results of the tests we conducted demonstrate good psychometric properties.

By examining in detail, the various validation tools of our quality system are used in our study through the analysis of the inter-factorial correlations and the analysis of the conceptual validity of the scale, which demonstrated acceptable factor weights and important indices of adequacy; and which are strongly cited in the literature in previous research. We can see that the dimensions can be very different within the same field, both in the number and aspects they propose to evaluate.

The research work we have carried out has resulted in a final version of the SEQES school quality measurement scale. It confirms the hypothesis of the multidimensionality of the measurement of school quality.

After this long process of development and validation of the school quality measurement scale, our study identified a final ranking of 37 items measuring seven factors: Organisational Climate (8 items), Operational Action Plans for the Productive Performance of the Institution (5 items), Supervision and Support (5 items), Resource Management and Working Conditions (8 items), Stakeholder Competencies (4 items), Organisational Leadership (3 items), Internal Performance of the Institution and Outreach (4 items).

Intending to specify the dimensions of quality raised more precisely, we found those that corresponded and reappeared in the literature and more or less corroborated by other research work by specific authors.

In an optic of specifying more precisely the raised dimensions of quality, we found those that corresponded to the literature and are more or less corroborated by other research works of some authors.

We cite the element of organisational climate in the school. Ntim [20] speaks of the quality culture within the institution that makes a pairing between organisational culture and management culture. Others talk about the measure of quality that differs according to the environment within the school structure

[39]. This environment shows encouraging effects on student motivation and human resources and thus active participation in school life.

The dimension of supervision and support includes several components; some authors, Van Maele and Lai Fong Cheng, examined teacher-student relations and their role in academic support and affecting the school's organisational climate [64]. Lai Fong Cheng talk in their study about the perceptions of principals and teachers for the quality improvement of the school based on meeting the needs of students [40].

In addition, the dimension of the operational action plan for the productive performance of the school is fed by theoretical models related to the vision of this structure and duties and values [30]. Wu et al. studied the factors that affect the school's quality, called the school's philosophy, and the school administration's role that has a significant impact on improving quality [76].

Adding that the dimension of stakeholder competencies revealed by the perceptions of the stakeholders is consistent with the results of some studies that have shown the degree of importance of stakeholder competencies in improving the quality of schools, whether at the primary or secondary level, the crucial role of school principals is in the management and conduction of the school's internal system as well as the improvement of student results, on the one hand, and the involvement of teachers on the other [66]. These findings are consistent with previous research conducted at the elementary and secondary school levels, as stated by Olson and Poston [67, 68].

Soria-García indicated that leadership is an important dimension [31]. This dimensional parameter is influential because the expertise of the school leadership and the strong involvement of administrators contribute to the essential effects. Casanova, Wu, and Svensson consider Leadership as one of the criteria for measuring total quality management (TQM) or factors affecting the quality of services in schools [65, 69, 76]. And some authors talk about the influence of leadership on strategic planning.

Regarding the dimension of the management of resources and working conditions, on the one hand, it is raised by the theoretical references of the material resources of the working conditions within the entities [13], that impact the quality and performance of the organisation. On the other hand, previous studies have highlighted the impact of human resources (HR) in schools.

Gunawan refers to students' perceptions of their employability which is part of the measurement tools studies and converges with the dimension of internal performance of the institution and its outreach [22]. The latter includes a set of attributes (graduate school integration rates: 50%, establishment of international streams in the school, flow rates) that constitute the school's performance and outreach facets.

In summary, this study has enriched the existing literature for the validation of measurement scales assessing the quality of the school, which remains a very complex organisation in deducing the quality given the intervention of several stakeholders in this educational field.

In any case, the measurement scale proposed in this article could be a significant contribution that has essential points to highlight. Contrary to others who have based their perceptions of quality on one or two actors within schools, as confirmed by Claude Ah-Teck [66], our study solicited the prominent actors (school principals, administrators of the school and provincial delegations and academics, teachers, and pedagogical inspectors), which constitutes a significant point for the validity and reliability of the proposed items.

Limitations

However, in this study, we have dimensions that have been developed, validated, and emerged from the perceptions of the actors participating in this study. They have been included, even if they correspond with the theoretical models referenced just on one or two items appearing in the dimension field, such as internal performance and its outreach and resource management.

Nevertheless, our study is not considered exhaustive, and it would present limits that we engage in spreading them. Although our study involved the different actors within the school to extract dimensions and indicators assessing quality, we did not consider the students' perceptions of quality and their needs due to organisational constraints, the availability of students, and the impossibility of organising focus groups. For there are differences in perceptions of quality characteristics among actors as indicated by the results of Wilson et al. [77], and which may be the subject of further studies that can reinforce the dimensions raised by this study.

In addition, it is challenging to evaluate specific dimensions such as the financial and pedagogical dimensions within the class group. These differences in perception could be the subject of other studies, including, for example, the representations and expectations of students, which could constitute another pillar for making these perceptions more comprehensive in determining quality education in the school. It also reinforces the assertions of quality theorists, who stress the importance of system and process improvement in achieving quality. For example, Shewhart reports that he has consistently asserted that a large majority of the problems and obstacles to rate cannot be attributed to employee motivation or skills [78] but rather to flaws in the design of systems and processes. Therefore, the methodological aspects used have allowed the development of a measurement scale to assess the quality of the school SEQES based on a pragmatic approach in developing quality indicators and will provide

a primary device determining the quality for schools and triangulated with institutional and conventional measures that can lead to a valuable benchmark for the secondary school environment.

Conclusion

The field of teaching and education is very different because of its specificity and, more particularly on a small entity of this complex system which is the school, characterised by the convergences of interests, among the different actors who participate in it (teachers, administrators, inspectorate, students, parents and guardians of students and partners). In addition, the importance of acquiring instruments that are specifically adapted to the context (specific domain and field of action, culture, school cycle, emerging and developed countries, etc.) has been raised by the results of Karatzias as complexity in determining school performance indicators in schools [79]. However, imperfect indicators are better than informal or subjective assessments, which are always open to criticism and have no value in a system, as confirmed by Kells et al. [80].

As a result of our research, we have optimised and validated a coherent measurement tool of indicators that give a serious and ambitious representation, based on rigorous scientific research, of the state of school quality and not just a collection of statistical data. We confirm the hypothesis that quality assessment in schools is multidimensional and heterogeneous. This study is aimed at optimising and constructing quality indicators, which will provide a framework for framing all stakeholders and actors in education. The statistical analyses show encouraging results, with reasonably excellent and acceptable psychometric characteristics. Also, this tool is characterised by a perfect internal consistency with a sufficiently satisfactory temporal stability.

In conclusion, the availability of a validated tool measuring quality in schools, which remains a complex field in the Moroccan context, is likely to encourage the exploration of parameters that are not taken into consideration by other instruments or only partially. It will serve better to understand the concept of quality in Moroccan schools. However, it should be noted that the validation of a system is always conditioned by its context of use and the simplicity and ease of its implementation.

The study aims to develop and validate a system for evaluating schools to make it a good instrument for measuring quality. This measurement instrument is a toolkit that can be developed in the future for decision-makers to establish a reference system for systematic external quality assessment at the national level. Moreover, a suitcase of tools for the inspection body and the directors of educational establishments which will have the following objectives:

- Improvement of the internal organisation and professional practices within the establishment's operational units (administrative and teaching teams).
- Improvement of the efficiency of organisations and school implementation of a quality approach appears as one of the ways to improve the performance of education and guarantee its effectiveness.
- Accreditation is the formula for institutional evaluation of quality in the education system: standards of competition between different schools.

For this reason, the model of a quality evaluation system that we are presenting remains simplified with understandable, precise, and diversified indicators.

At this stage, it is too early to talk about norms and standards that will constitute a repository of evaluation indicators to judge quality. This lack of a national reference system is still a motivation to show that this field opens the perspective for further research.

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