ESTUDIOS

Revista **Complutense de Educación**
ISSNe: 1988-2793

http://dx.doi.org/10.5209/RCED.51646

EDICIONES COMPLUTENSE

Design and validation of a scale to evaluate the impact of implementing a quality management system in schools[1]

Rafael Carballo Santaolalla[2]; Mª José Fernández Díaz[3]; Jesús Miguel Rodríguez Mantilla[4]

Recibido: enero 2016 / Evaluado: junio 2016 / Aceptado: septiembre 2016

Abstract. Implementation of quality management systems in educational organisations is a fact in many countries. Schools adopt systems to establish an improvement plan, based on evaluating everything they do, thus searching for continuous improvement. Objective evidence of the improvement and changes must be gathered and tools and techniques are thus required to evaluate all of these changes. This paper presents a scale with a design and an analysis of its technical characteristics, using a total sample of 709 teachers and principals of 29 primary and secondary education schools of two Spanish regions. Results show that the overall reliability of the scale is very good, with a Cronbach's α of .988 and values higher than .92 in each of the six dimensions of the scale. The item analysis shows the level of homogeneity, with values over .25, in all of them. The validity of the scale is also good since the dimensions and subdimensions used are consistent, and the empirical data and the unidimensionality of the construct is proven.
Keywords: Impact; quality of education; schools; measuring instrument; scale.

[es] Diseño y validación de una escala para evaluar el impacto de la implantación de un sistema de gestión de la calidad en centros educativos[5]

Resumen. La implantación de sistemas de gestión de la calidad en las organizaciones educativas es una realidad en muchos países. Los centros adoptan sistemas para establecer una política de mejoras, basadas en la evaluación de todo lo que se realiza en ellos. Sin embargo, se precisa obtener evidencias objetivas de las mejoras y cambios que se producen, buscando de este modo la mejora continua. En este trabajo se presenta el diseño de una escala sólidamente fundamentada y el análisis de las características técnicas del mismo, utilizando una muestra de 709 profesores y directores de 29 centros de primaria y secundaria de dos comunidades autónomas de España. Los resultados muestran que la fiabilidad de la escala analizado, a nivel global, es muy bueno, con un α de Cronbach de 0,988 y con valores superiores a 0,92 en cada una de las seis dimensiones. El análisis de ítems muestra la homogeneidad de los mismos, con valores superiores a 0,25 en todos los casos. La validez de la escala es buena, hay consistencia entre las dimensiones y sub-dimensiones, e incluso se prueba la unidimensionalidad del constructo.
Palabras clave: Impacto; calidad de la educación; centros de enseñanza; instrumento de medida; escala.

---

[1] This study is part of a broader project: R&D+I EDU 2009-14773-C02, Impact of Implementation of Quality Systems in Schools, financed by the Ministry of Science and Innovation.

[2] Complutense University of Madrid (Spain)
E-mail: rafacar@ucm.es

[3] Complutense University of Madrid (Spain)
E-mail: mjfdiaz@ucm.es

[4] Complutense University of Madrid (Spain)
E-mail: jesusmro@ucm.es

[5] Esta investigación forma parte de un proyecto más amplio: I+D+i EDU 2009-14773-C02, Impacto de la implantación de sistemas de calidad en centros educativos, financiado por el Ministerio de Ciencia e innovación.

Cómo citar: Carballo-Santaolalla, R., Fernández-Díaz, M.J. y Rodríguez-Mantilla, J.M. (2017). Diseño y validación de una escala para evaluar el impacto de la implantación de un sistema de gestión de la calidad en centros educativos. *Revista Complutense de Educación,* 28 (4), 1211-1226.

1. Introduction

The progressive implementation of quality management systems (QMS) in educational organisations of all levels is a fact in many countries in practically all continents. The concern for quality has been underlying this movement, as well as the wish to find alternatives for improvements in these organisations that are sound and systematic. Their development and dissemination has been essentially motivated by the belief that under these conditions not only would the operations, processes or services offered improve, but also productivity and performance. They are based, no doubt, on powerful theoretical approaches, on the original models, and on the evaluation system used as a key tool for obtaining evidence of continuous improvement of all organizational elements or dimensions, which is a characteristic inherent to the concept of quality.

The drive to implement and track these systems grow worldwide (Chen, Chen, & Chen, 2013; Duque, 2013; Mehta, Verma, & Seth, 2013). From the various administrations, public or private, to the organisations promoting these models (ISO Standards, Total Quality Management Models, and other alternatives), they all defend the need and relevance of the management systems associated with these models in order to set up continuous improvement plans throughout the organisation. These plans are conceived globally and as a set of closely interrelated components which require joint analysis, under a systemic conception of improvement.

However not everyone is a major advocate of these models and management systems. Detractors also strongly criticise and challenge their relevance in improving organisations, especially in the education sector. They have questioned and been critical of the adoption of models originally designed for companies and later adapted to schools (Doherty, 2008). This criticism has gradually decreased with time due to the positive experiences of many centres. For some, these systems are excessively bureaucratic, as they require recording and documenting everything done in the school. Some of these opposing views are grounded on an implementation process at the school that has not considered the importance of raising awareness among the staff as essential players in the process or the importance of their participation to improve the organisation.

Nonetheless, the supposed improvement generated by these systems requires proof and evidence. Until now barely any references could be found in literature and the limited evidence from studies has not provided identical results on the usefulness of quality management systems in schools (De Vries, 2005; Gibb, 2003; Stensaker, Langfeldt, Harvey, Huisman, & Westerheijden, 2011). While some studies seem to show considerable improvements in education (Cantón Mayo & Arias Gago, 2009; Chen, Lyu, & Lin, 2004; Dobyns & Crawford-Mason, 1994; Kattman & Johnson, 2002; López Alfaro, 2010; Ramírez García & Lorenzo, 2009; Stensaker, 2007; Tribus, 1993), other papers indicate their effects are irrelevant or even detrimental for education centres. In universities, where more studies of this kind have been conducted, there are authors who consider that there is hardly any evidence that quality assurance systems are efficient or achieve the expected results and rather, on the contrary, they seem to

encourage bureaucracy in organisations, with no effect on the core aspects of education processes, and can even be detrimental (Harvey & Stensaker, 2008).

Given this situation, the pertinent question is: do they help improve the quality of an organisation? There is no doubt that the arguments and procedures required for their implementation appear to indicate their efficacy, as has been expressed by those who, with a greater or lesser level of confidence, decided at one point to set up a management system. Yet it is necessary to go further and evaluate their efficacy throughout the organisation and the effects on the centre as a result of implementing the system. It is well known that this implementation always triggers improvement programs when the desired results are not achieved or when areas for improvement are detected during the evaluation processes used in the quality management system in the various elements of the whole organisation. That is, evaluations are carried out at different levels depending on the nature of what is being assessed, whether they are learning-teaching processes, teaching quality, school or out-of-school activities, organisational climate, among others. No doubt these are very complex processes which require the right organisation to implement the management system. It seems evident that improvement plans must help achieve said improvement as planned and designed, if approached with the professionalism and rigour that any evaluation process entails and any improvement plan requires.

Without going into the requirements of implementing a management system, it would seem logical to think that such a system aims to achieve not so much immediate or short-term improvements, but rather medium to long-term changes. These would be sustainable changes, either in the way the organisation works, or in its culture, or in the planning system, among other aspects. They should generate ways of working that could be considered a true transformation of the organisation. This transformation cannot only take place at the start of the implementation, not even during the first years, but rather it should be consolidated over time, as a consequence of the progressive implementation of the system. These are the medium-long term effects. In this sense, it is necesary to differentiate immediate results from those generated over time as a consequence of implementing the system and improvement plans, through interaction with other factors in the same context, centre or organisation. In this paper, it has been termed the latter "impact", to differentiate it from the immediate results referred to above. The Royal Spanish Academy (De la Lengua Española, 2001) defines impact as "leaving a mark", although some people use the term in both senses (Fernández Díaz, 2013).

Assessing the effects of implementing a quality management system is essential to provide validated and reliable evidence. It is not easy to assess the effects of complex processes that cover the whole educational organisation, integrated in the QMS. Organisations in themselves are highly complex and the systems are equally complex and, obviously, assessing their effects is equally difficult. Logically, this difficulty is substantially increased when the aim is to assess effects that become apparent in the medium-long term, that is, the so-called impact.

Assessment should be carried out from the start, obtaining data before implementation and then continuing with the evaluation process over time, assessing the various changes and their development and finally, analysing the factors which could increase or decrease the effects. Longitudinal designs are the most appropriate for this type of studies (Fernández Díaz, 2013), as they allow assessing progression of

changes from baseline data and consequently, of any possible improvements already consolidated and integrated in the organisation.

Evaluation of a design of this type implies analysis and design of instruments that allow detecting changes and progression. However, very frequently we find that the educational or intervention programmes lack integrated evaluation plans that permit their efficacy in the organisation or school to be assessed, after the intervention or action has been completed. Consequently, in general, there is no information to assess the medium-long term impact or the knowledge transfer which has taken place. In the case under examination, the authors can confirm the absence of these evaluation plans in all cases, therefore the design involved in this study could not be based on assessment designs that were part of the scheme to implement a management system because in fact they were never actually planned that way. Therefore, it was adopted an ex post facto procedure for an indirect approach towards evaluation of these changes, taking the education community of the school as the source of assessment, through their perception as actors and observers of these changes, provided they have been in the school over the years it has taken to implement the system.

With these premises, this study includes the design and validation of an instrument to determine the impact of implementing a quality management system (EFQM or similar) on the management and activities of primary and secondary education schools.

In order to do this, the investigation began with a detailed study of educational organisations and QMS, especially the European Excellence model (EFQM, 2012), and dimensions which can impact these systems were determined (with a dual comprehensive and multidimensional approach) analyzing the school as a whole, including all the large dimensions of a cross from a theoretical perspective the analysis of educational organizations and literature search of the literature on these (Cetzal, Delgado & Reche, 2012; Lorenzo, 2011; Thurler & Maulini, 2010; Trujillo, 2007; Rodríguez, 2006; Antúnez & Gairin, 1996). Next, it was defined the subdimensions that help us justify the contents to be assessed and identify the indicators and items that make up the scale, under the above perspective of assessing the perception of the various actors in the education community. It is important to note that in the references analysed the authors found no tools for assessing the impact of implementing a QMS, or any other techniques that could be used or referred to. Evidently, as already outlined, the limited research found on this topic is also manifest in the measurement techniques. It should be noted that the EFQM model also considers the organizations in this dual approach (EFQM, 2012), so it seems appropriate this first consideration. This aspect is key to assessing the impact globally and for each of the dimensions contemplated. Thus, the dimensions identified and defined were the following:

— *Information and Communication Systems*: Refers to the effect caused by implementing a QMS and creating and improving the vertical and horizontal communication and information systems among all the members in the school's education community.
— *Management System*: Obviously, implementation of a QMS should have a direct effect on the school's Planning Culture. This includes aspects related to how activities, whether they be academic (learning-teaching process, services, tutoring…) or management (out-of-school activities, complementary or of any other type), are organized or structured using the systematised design of work systems and information management as part of the QMS. Also included in

this dimension are the possible effects related to Support and Reward Policies for the members involved in developing the school's activities.

— *School Climate*: Refers to the effects of a QMS on the changes and improvement of internal relations between all the members in the school: teachers, students, families, administrative staff and managers, as well as an increase in participation and involvement of all in the operation and quality improvement of the school.

— *Learning-Teaching Processes*: Learning-teaching processes are the core elements of a school. Therefore, the QMS must play a part in developing and defining classroom methodologies, using the results to improve and update these processes, monitoring all teaching activities, improving the quality of the teachers and staff, getting families to participate in the various education actions… Ultimately, this dimension aims to assess the impact caused by the QMS on improving the organisation and development of teaching and education activities carried out at the schools and on their results.

— *Satisfaction of the Education Community*: A clear reflection of the impact of a QMS is continuous improvement of evaluation results and the level of satisfaction of the various participants in the education process: teachers, administration and services staff, students, families…

— *External Relations and Links to Society*: QMS increasingly value the external projection of institutions in their community, such as: relations with other schools, institutional relations, mobility and exchange programmes, school image… Therefore, it is necessary to know how implementation of the QMS has contributed to this.

2. Method

This article focuses on determining the technical quality of the Scale for Evaluation of the Impact of Quality Management Systems on Schools to improve primary and secondary education schools with over 3 years of implementation, using assessments conducted by their management team and the teachers involved.

2.1. Sample

The study included 29 primary and secondary education schools in two Spanish regions (15 from the Autonomous Community of Castilla-León and 14 from the Autonomous Community of Madrid), of which 51.9% were public, 14.8% private and 33.3% private with state subsidies. They all met the requirement of having implemented a QMS (EFQM or similar) for at least 3 years (average implementation in the sample was 8 years). A total of 709 staff members responded to the scale: 85% teachers and 15% managers.

2.2. Design of the scale

To prepare the scale the authors used the dimensions and subdimensions referred to above which were made operative through specific indicators. Table 1 shows the structure of the scale and the number of items associated to each dimension and subdimension, as well as the name they are presented under in the analysis.

Table 1. Structure and Composition of the Scale

DIMENSION		SUBDIMENSIONS	ITEMS	Nº ITEMS
I. COMMUNICATIONS		I.1 Communication Systems	COM 01-02	15
		I.2 Process Systematisation	COM 03-05	
		I.3 Communication Channels	COM 06-14	
		I.4 OVERALL assessment of the dimension	COM 15	
II. MANAGE-MENT SYSTEMS	Planning Culture	II.1 Improvement of Planning System	MS PC 17-22	35
		II.2 Frequency and Usefulness of Meetings	MS PC 23-27	
		II.3 Use and Usefulness of Documents	MS PC 28-30	
		II.4 Period. and Usefulness of Document Review	MS PC 31-34	
		II.5 Usefulness and Use of Results for Planning	MS PC 35-38	
		II.6 OVERALL assessment of the subdimension	MS PC 45	
	Support and Reward Policies	II.8 Establishment of Rewards System	MS SRP 46	
		II.9 Improvement of Rewards and Support System	MS SRP 47-52	
		II.10 Improvement of Rewards and Incentives	MS SRP 53-54	
		II.11 OVERALL assessment of the dimension	MS SRP 55	
III. SCHOOL CLIMATE		III.1 Influence on Internal Procedure Regulations	CLIMATE56-58	25
		III.2 Improvement of Rel. in the Educ. Community	CLIMATE59-65	
		III.3 Improvement of Conflict Resolution	CLIMATE66-71	
		III.4 Improvement of Teacher Participation	CLIMATE72-77	
		III.5 Improvement of Family Participation	CLIMATE78-79	
		III.6 OVERALL assessment of the dimension	CLIMATE80	
IV. LEARNING-TEACHING PROCESSES		IV.1 Use of Student Evaluation Results	L-TEACH 81-83	26
		IV.2 Use of Student Attitudes	L-TEACH 84-85	
		IV.3 Family Involvement	L-TEACH 86-88	
		IV.4 Improvement and Control of Teach. Meth.	L-TEACH 89-93	
		IV.5 Creation and Ass. of Teach. Eval. System	L-TEACH 94-102	
		IV.6 Evaluation and Follow-up of Tutoring Plan	L-TEACH 103-105	
		IV.7 OVERALL assessment of the dimension	L-TEACH 106	
V. SATISFACTION		V.1 Improvement of Educ. Community Satisfact.	SATIS 107-109	4
		V.2 OVERALL assessment of the dimension	SATIS 111	
VI. EXTERNAL RELATIONS		VI.1 Increased relations with other schools	RELA 112-113	17
		VI.2 Increased relations with Institutions	RELA 114-116	
		VI.3 More Mobility and Exchange Programmes	RELA 117-120	
		VI.4 Improvement of School's External Image	RELA 121-123	
		VI.5 Greater Use of Available Resources	RELA 124-127	
		VI.6 OVERALL assessment of the dimension	RELA 128	
TOTAL				122

It was decided to use a Likert-type scale with five points, as it is appropriate for compiling information from a high number of subjects and a significant number of aspects. It can be quickly applied to a large number of subjects and the formulation is simple and clear. The scale has instructions to assess how implementing a QMS has influenced the improvement and current status of each indicator, from very low (1) to very high (5). To the 122 items comprising the scale (see Annex — Note that items 16, 39-44, 46 and 110 were excluded from analysis because they concerned matters unrelated to this study; however, it has respected the order and numbering of the remaining items) it was added the specific category data for this type of instruments,

including: type of school, age of respondent and years of teaching experience at the school ..The scale was anonymous.

2.3. Analysis of the technical characteristics of the scale

The quality of the information compiled is an essential element of any research and evaluation process, where measurement is a basic requirement. No doubt this process is particularly complex in the field of Social and Behavioural Sciences due to the usual problems of its indirect nature, the difficulty to define features and make the construct operative (Maydeu-Olivares & McArdle, 2013).

2.4. Validity of the content

The scale used in this study was designed with the theoretical bases referred to above and a systematic structure to guarantee its coherence and consistency. During the first phase the authors worked to ensure the validity of its contents. In order to ratify this theoretical validity, the scale was submitted for review by 13 experts (heads of school, teachers, experts on QMS…) to analyse the relevance of the aspects considered and the clarity and precision of the items. The goal was to compile information that would respond to clear and specific aspects which respondents could assess, ensure that the items were comprehensible, and at the same time avoid missing relevant aspects and repeating concepts. The experts were asked to assess each item on a scale from 1 (very low relevance or clarity) to 5 (very high relevance or clarity). Out of all the items, there were only two that did not reach an average relevance of 4 and most of them achieved very high scores above 4.5. Once the authors corrected those two items and revised some suggestions on the drafting of the items, the scale was considered validated.

3. Results

3.1 Reliability

The reliability of the information obtained is an essential factor for the quality of any study. In this case, *Cronbach's alpha* (α) was used to calculate reliability (internal consistency of the scale) and the Homogeneity Index to analyse the items, and verify the contribution and quality of each one (Pardo & Ruiz, 2002). The analyses were conducted both for all of the scale items as well as for each dimension, separately. Table 2 shows the results. With relation to the *Homogeneity Indexes*, Table 2 includes the highest and the lowest value of the items involved in each analysis.

Table 2. Scale Reliability

SCALES	Nº of items	Cronbach's α	Homogeneity Indexes	
			Lowest	Highest
I. COMMUNICATIONS	15	.9342	.5750	.8134
II. MANAGEMENT SYSTEM	35	.9492	.2985	.6983
III. CLIMATE	25	.9695	.4151	.8910
IV. LEARNING-TEACHING PROCESS	26	.9650	.4448	.8234
V. STAKEHOLDER SATISFACTION	4	.9270	.7546	.8668
VI. EXTERNAL RELATIONS	17	.9445	.5872	.8007
TOTAL	122	.9881	.894	.7842

As shown, the coefficients for total reliability and for each dimension were very high (α above .92 in all cases). The *Homogeneity Indexes* were also favourable (above .25 for the total and for the dimensions), which gives us an idea of the high internal consistency of the scale and the quality of the items prepared.

3.2. Validity

Although the scale was grounded on a theoretical approach for greater consistency, and the expert review confirmed the validity of its contents, it was important to analyse the validity of its construct based on empirical results. For this it was used the *Exploratory Factor Analysis* technique to understand the structure of the scale, the nature of the factors and, ultimately, the coherence between the theory and the empirical data (Hair, 2005).

The analysis started by verifying the significance of the correlation matrix (R) in the 122 items of the scale. The three statistics used (R determinant = 1.708E-86, KMO = .808 and Bartlett's Test of Sphericity $\chi 2 = 21229.822$ $p < .01$) showed highly significant values of the R matrix detecting high rates of interrelation between the scale items. Thus, it was possible to group the scale into factors that reveal the underlying dimensions.

To extract factors used two different procedures: the Principal Components Analysis (PCA) and the Alpha Method (AM). 10 factors was extracted which explained nearly 66 % of R variance, therefore the solution was considered a good one. In the Principal Components factorization all items had good commonality ($h2 > .50$), while with the Alpha method they all had equally acceptable values, although slightly lower ($h2 > .4$). Logically, for the latter solution the variance explained dropped slightly, to 62%. To facilitate interpretation factor loadings (aij) lower than .4 were dismissed, as they are usually not important in determining their nature.

Both solutions underwent Promax rotation and high correlations between the 10 factors obtained were found in the two. The two solutions provided very similar structures, which showed the robustness of the factors obtained. Since the factors were somewhat more consistent with the Principal Components solution, it was used to interpret first order factors and to obtain second order factors (Cea D'Ancona, 2002; Stevens, 2012).

The 10 factors were shown to be consistent, unipolar and specific, as well as robust, as mentioned above. The only one which was less consistent was Factor 10 which, being the last, was the one explaining least variance. The factors identified were the following:

1. *Improvement of School Climate and Satisfaction with QMS.* Gathers the two dimensions of Climate and Satisfaction which are usually quite close both conceptually and in the assessment of respondents.
2. *Improvement of Learning-Teaching Processes*. Basically groups the items showing the influence of QMS on the learning-teaching processes inside and outside the classrooms, the evaluation processes and their use for improvement, as well as improvement of teachers' methodology as a result of the quality evaluation model.
3. *Improvement of Communications*. Includes impact of QMS on the school's communications systems and channels, both vertical and horizontal.
4. *Improvement of Document Usefulness*. This factor groups items related to the impact on the school's management system referring to improvement of usefulness both of basic documents for improving decision-making planning and usefulness of meetings.
5. *Improvement of Support and Reward Policy*. This factor includes the effect of QMS on improvement of the school's reward and support system for its staff, climate, conflict resolution…
6. *Improvement of Mobility and Exchange Policy and Usefulness of Evaluations*. This is a factor that shows certain inconsistency as it covers two slightly different dimensions (at least theoretically) which are impact of QMS on mobility and exchange policies and use of academic results and student and teacher satisfaction for improvement of the management system.
7. *Improvement of Community Relations*. Refers to external projection and recognition of the school due to the QMS, as well as use of community resources.
8. *Improvement of Planning System*. This factor reflects the impact the QMS has had on improving planning processes for academic activities inside and outside the classrooms.
9. *Improvement of Meeting Usefulness*. Clearly reflects the impact which QMS had on the usefulness of meetings of the various teaching bodies.
10. *Improvement of Document Use for Planning*. Since this is the last factor it is the one explaining the least variance (which is why it has the lowest factor loadings) but it groups items related to the effect of the QMS on the school's Planning Culture.

Therefore, the first order factors basically respond to the dimensions initially defined or to one of its subdimensions, which confirmed the structure initially established for the scale and the impact dimensions identified in the initial model. Since high correlations were detected between the first order factors (Table 3) it was decided to extract second order factors.

Table 3. Matrix of Correlation between First Order Factors. Extraction method: Analysis of Principal Components. Rotation method: Promax with Kaiser normalisation.

Components	1	2	3	4	5	6	7	8	9	10
1. School climate and Satisfaction with QMS	1									
2. Teaching-Learning Processes	.610	1								
3. Communications	.577	.492	1							
4. Usefulness of planning documents	.432	.354	.481	1						
5. Support and reward policy	.512	.496	.414	.324	1					
6. Mobility and exchange policy and Usefulness of evaluations	.549	.488	.457	.306	.514	1				
7. External relations	.506	.528	.412	.255	.453	.335	1			
8. Improvement of Planning system	.607	.513	.490	.340	.480	.460	.408	1		
9. Usefulness of meetings	.378	.309	.229	.049	.292	.252	.302	.453	1	
10. Use of documents in planning	.359	.320	.269	.087	.255	.205	.421	.260	.268	1

To obtain second order factors, as in the previous case, the (R) correlation matrix between the 10 first order factors was factorised through the Principal Components Analysis (PCA) and the Alpha Method. Once again the R matrix significance was tested, using the same types of indexes (R determinant = .024, KMO = .9 and Bartlett's Test of Sphericity $\chi^2 = 542.4$ $p < .01$).

It was extracted only 2 factors, which explained slightly over 57%. We ruled out extracting a third one as it did not explain even 10% of total variance. In the PCA solution all commonalities were higher than .5, while in the Alpha Model they were rather lower, although always above .3. In the latter case the variance explained did not reach 50%. Both extractions were subject to a Promax rotation. As with the first order factors, the PCA solution was far more consistent than the Alpha one, but equivalent with regard to defined factors, therefore the solution was once again robust. Both factors were found to be consistent (Table 4). In this case the second factor could be defined as Impact of QMS on improvement and promotion of a planning culture and external projection of the school, while the first one would refer to the Impact on the various operational systems in the school.

Table 4. Configuration Matrix for Second Order Factors. Extraction method: Analysis of Principal Components. Rotation method: Promax with Kaiser normalisation.

FIRST ORDER COMPONENTS	**2nd Order Comp.**	
	1	**2**
4. Usefulness of planning documents	**.952**	-.488
3. Communications	**.801**	
6. Mobility and exchange policy and Usefulness of evaluations	**.676**	
1. School climate and Satisfaction with QMS	**.674**	
2. Teaching-Learning Processes	.596	
5. Support and Reward policy	.581	
8. Improvement of Planning System	.534	.325
9. Usefulness of meetings		**.786**
10. Use of documents in planning		**.766**
7. External relations	.306	.518

A correlation above .52 was found between the two second order factors in the case of the PCA solution, and was higher than .75, in the case of the Alpha extraction, which would indicate the existence of a single factor underlying the whole scale, thus proving that the construct is unidimensional: Impact of School Quality Management Systems.

4. Discussion and conclusions

The objectives of the study have been achieved: design and technical analysis of a tool that evaluates the impact of implementing quality management systems in educational organisations. The literature analysis revealed the limited number of studies that have been conducted internationally on this topic. There is thus a need for research, based on technical and rigorous procedures, that can provide evidence to assess whether quality management systems lead to changes or improvements in schools, generate relevant changes over time, modify the work culture and even the way of thinking. Research should also analyse which factors are more or less successful when implementing these systems, which would help establish the best conditions for future implementation processes in other schools and, consequently, improve their chances for success.

It should be remembered that while some authors defend the relevance of these systems to establish grounded improvements, others are very critical of them and even view them negatively. Shedding additional light on the debate is just one more reason to promote research in this field, especially considering the growing use of these systems.

The scale's design has been based on an in-depth analysis of quality, quality models and quality management systems, educational organisations and the European Excellence model (EFQM), to the extent that we have included schools that have implemented this model, or models with slight variations in some schools, and other studies related to this topic. With this analysis six major dimensions were defined where the authors consider that changes must be apparent: Communications, Management Systems (planning culture and support and reward policies), School Climate, Learning-Teaching Processes, Satisfaction and External Relations. These dimensions were divided into subdimensions and indicators on which the scale was based, comprising 122 items.

The technical analysis of the scale shows the quality and validity of the tool when assessing the efficacy, in terms of impact, of implementing quality management systems in educational organisations and the factors that are important for their success. The scale is highly reliable, both globally, with a Cronbach's α of .988, and for each one of the six dimensions defined, with values higher than .92. All of the items show acceptable Homogeneity Indexes, with values above .25.

The validity of the scale contents is justified by the theoretical grounds used to design the tool, and by the expert review conducted during preparation of the final application. Furthermore, the tool's validity has been proven. The analysis show the tool's internal consistency between the theory it is based on and the empirical data obtained. The factors extracted match the scale's theoretical structure and subsequent analysis prove that the construct underlying the tool is unidimensional.

Hence this work provides the scientific community with a valid and reliable tool for evaluation studies or research on this topic. However, it should be noted that

the complexity of the schools and the models applied mean that a single technique should not be used to compile information. Others are required to delve into or understand certain aspects which are difficult to assess with this scale (as was done with the full study carried out), but not all involve the same level of complexity.

It is also necessary to evaluate and study the impact derived from applying other systems, such as ISO Standards or other total quality management plans or systems. In any case, this tool can be helpful to evaluate the impact of implementing the abovementioned systems. All of this provides a challenge to continue with this line of research.

5. References

Antunez, S. & Gairín, J. (1996). *La organización escolar, Práctica y fundamentos*. Barcelona: Grao.

Cantón Mayo, I., & Arias Gago, A. R. (2009). Metáforas y teorías implícitas de los directores escolares. *Educación XXI, 28*(1), 227-248.

Cea D'Ancona, Mª A. (2002). *Análisis multivariable. Teoría y práctica en la investigación social*. Madrid: Síntesis.

Cetzal, R. S. P., Delgado, M. L., & Reche, P. C. (2012). El poder en las organizaciones escolares… todos lo buscan, pocos lo consiguen. *Revista Educación y Ciencia*, *2*(40).

Chen, Y., Chen, J., & CHEN, C. (2013). Teaching quality in higher education: An introductory review on a process-oriented teaching-quality model. *Total Quality Management & Business Excellence, 25*(1-2), 36-56.

Chen, Y., Lyu, J., & Lin, Y. (2004). Education Improvement through ISO 9000 Implementation: Experiences in Taiwan. *International Journal of Engineering Education, 20*(1), 91-95.

De la Lengua Española, Diccionario. (2001). Real Academia Española. *Vigésima, 2*.

De Vries, W. (2005). *Calidad, eficiencia y evaluación de la Educación Superior*. Madrid: Netbliblo.

Dobyns, L., & Crawford-Mason, C. (1994). *Thinking about Quality: Progress, wisdom, and the Deming philosophy*. New York: Random House.ndi

Doherty, G. D. (2008). On Quality in Education. *Quality Assurance in Education, 16*(3), 255-265.

Duque, L. (2013). A framework for analysing higher education performance: students' satisfaction, perceived learning outcomes, and dropout intentions. *Total Quality Management & Business Excellence, 25*(1-2), 1-21.

European Foundation for Quality Management-EFQM (2012). *Modelo EFQM de Excelencia 2013®*

Fernández Díaz, M. J. (2013). Evaluación del impacto para un cambio sostenible en las organizaciones educativas. *Revista Española de Pedagogía, 254*, 45-65.

Gibb, J. (2003). *What impact is implementing a quality system having on the vocational education and training classroom?* Leabrook: National Centre for Vocational Education Research.

Hair, J. F. (2005). *Análisis multivariante*. Madrid: Prentice Hall.

Harvey, L., & Stensaker, B. (2008). Quality culture: Understandings, boundaries and linkages. *European Journal of Education, 43*(4), 427-442.

Kattman, R., & Johnson, F. G. (2002). *Successful Applications of Quality Systems in K-12 Schools*. Milwaukee: ASQ.

López Alfaro, P. (2010). El componente liderazgo en la validación de un modelo de gestión escolar hacia la calidad. *Educação e Pesquisa, 36*(3), 779-794.

Lorenzo, M. (2011). *Organización de centros educativos. Modelos emergentes*. Madrid: La Muralla.

Maydeu-Olivares, A., & MCardle, J. (2013). *Contemporary Psychometrics*: Psychologycal Press.

Mehta, N., Verma, P., & Seth, N. (2013). Total quality management implementation in engineering education in India: an interpretive structural modelling approach. *Total Quality Management & Business Excellence, 25*(1-2), 124-140.

Pardo, A., & Ruiz, M. A. (2002). *SPSS 11: Guía para el Análisis de Datos*. Madrid: McGraw-Hill.

Ramírez García, A., & Lorenzo, E. (2009). Calidad y Evaluación de los Centros Educativos no Universitarios en Andalucía: Una adaptación de la EFQM. *Revista Iberoamericana de Evaluación Educativa, 2*(2), 22-45.

Rodríguez, D. (2006). Dimensión institucional, cultural y micropolítica: claves para entender las organizaciones educativas. *Revista Electrónica Interuniversitaria de Formación del Profesorado, 9*(1), 1-14.

Stensaker, B. (2007). *Impact of quality processes.* Paper presented at the Embedding quality culture in higher education: A selection of papers from the 1st European Forum for Quality Assurance.

Stensaker, B., Langfeldt, L., Harvey, L., Huisman, J., & Westerheijden, D. (2011). An in-depth study on the impact of external quality assurance. *Assessment & Evaluation in Higher Education, 36*(4), 465-478.

Stevens, P. (2012). *Applied multivariate statistics for the social sciences*: Routledge.

Thurler, M. G., & Maulini, O. (2010). *La organización del trabajo escolar.: Una oportunidad para repensar la escuela* (Vol. 268). Barcelona: Graó.

Tribus, M. (1993). Why not education: Quality management in education. *Journal for Quality and Participation, 16*(1), 12-21.

Trujillo, J. M. (2007). Análisis interno de la organización: liderazgo y micropolítica en un centro educativo. *Innovación educativa*, (17), 37-52.

6. Annex

Items

I. COMMUNICATIONS

01. Increased use of ICT, e-mail, intranet, school website, etc.
02. Increased use of suggestion box
03. Improved systematization of communications in the school
04. Improved systematization of horizontal communications in the school
05. Improved systematization of evaluation of the various communication systems seeking their improvement
06. From management team to teachers
07. From area, cycle or stage coordinators to teachers
08. Improved efficiency of communication channels between counselling department and teachers
09. Improved efficiency of communication between school and families

10. Between teachers
11. From teachers to Management Team
12. From teachers to area, cycle or stage coordinators
13. Improved efficiency of communication channels between teachers and counselling department
14. Improved efficiency of communication channels between families and the school
15. General assessment of the impact which implementation of the quality management system has had on the school's communications system

II. MANAGEMENT SYSTEMS

17. Academic activities for the class have improved
18. Teaching-learning process has improved
19. Systematic subject, class, cycle teacher meetings have improved
20. Tutoring has improved
21. Regular meetings with parents have improved
22. Complementary activities have improved (visits to museums, school trips, etc.)
23. Usefulness of meetings of management team with teachers
24. Area, cycle or stage coordinator meetings have improved.
25. Meetings with the department of orientation and teachers have improved
26. Usefulness of teacher meetings
27. Implementation of the quality model entails keeping meeting records
28.a Improvement of the level of usefulness of curricular project as the basis for classroom scheduling
28.b Usefulness of curricular project as basis for classroom scheduling has improved
29.a Improvement of usefulness level of Annual General Scheduling as the basis for scheduled actions
29.b Usefulness of General Annual Scheduling as basis for actions scheduled has improved
30.a Improvement of usefulness level of strategic planning, defined as short, medium and long-term school objectives
30.b Increased use of Strategic Planning, defined as short, medium and long-term school objectives
31. Usefulness of Educational Project review
32. Usefulness of Curricular Project review
33. Usefulness of Annual General Scheduling review
34. Usefulness of Strategic Planning review
35. Has improved level of usefulness of student academic performance
36. Has improved level of usefulness of evaluation of teachers' work
37. Has improved level of usefulness of evaluation of complementary activities
38. Has improved level of usefulness of evaluation of out-of-school activities
45. General assessment of the impact which implementation of the quality management system has had on the school's Planning Culture.
47. Has improved systematisation of detection and periodical study of staff expectations
48. Has improved systematisation of management of complaints and suggestions
49. Has improved systematisation of regular evaluations of staff satisfaction
50. Has improved systematisation of recognition of successful achievement of relevant objectives, in public events or other contexts
51. Has improved systematisation of recognition of improvement of school climate to resolve conflicts
52. Has improved evaluation and regular follow-up of support, recognition and reward policies
53. Has improved recognition of teachers who systematically achieve excellent results with their students
54. Has improved incentives of teachers preparing and developing improvement proposals
55. Assess, in general, the impact which you consider implementation of the Quality Plan has had on the Support, Recognition and Reward Management System at your school

III. SCHOOL CLIMATE

56. Dissemination of coexistence rules among the school staff
57. Involvement of school staff in the definition of coexistence rules
58. The Internal Procedure Regulations are systematically applied
59. Has favoured a good professional climate between Management Team and teachers
60. Promoted that relations among teachers are, in general, positive
61. Promoted that MT favours a positive climate in the school
62. Has promoted, in general, cordial relations between families and school
63. Has promoted adequate teacher control of classroom discipline
64. Has promoted, in general, cordial relations between families and school
65. Has promoted systematic evaluation of school climate
66. Measures taken with more difficult students are more efficient.
67. Greater efficiency in the measures taken with problem teachers
68. Training teachers in conflict resolution skills
69. Has enabled school to follow a conflict resolution plan whenever there is a problem
70. Teachers' conflict resolution skills have improved
71. Management Team is more efficient resolving conflicts in school
72. Has improved teacher cooperation to prepare and organise events (Christmas, Science Week…)
73. Has improved teachers' willingness to work, update Education Project, classroom schedules…
74. Has improved teachers' interest to participate in innovation projects in the school
75. Has improved teachers' interest to learn teaching methodologies, ICT training, etc.
76. Sharing teaching experiences among teachers in the same school and in other schools
77. Evaluation of teacher participation and collaboration in school events
78. As a result of implementing the quality model, family involvement in school has improved
79. Has improved family involvement in Parent-Teacher Association
80. Assess, in general, the impact which you consider implementation of the Quality Plan has had on improving your School Climate

IV. LEARNING-TEACHING PROCESSES

81. Action plans are prepared based on student assessment sessions
82. The results obtained by students in external tests are analysed
83. Measures are systematically taken for students with lower than required performance
84. Student attitudes and values are taken into consideration, in a systematised manner, for their participation and undertaking of activities (extracurricular trips, student exchanges, positions of responsibility, etc.)
85. Has promoted that final grades include student values and attitudes
86. School carries out family involvement policy that seeks their engagement with their children's learning-teaching process
87. There is a systematised information procedure to inform families of continuous progress of their children's performance
88. Family participation and involvement at school is systematically evaluated to enhance their engagement
89. Teaching methodologies used by teachers are systematically assessed
90. Teachers have a common methodology defined by areas and education cycles
91. Teachers study the most appropriate teaching methodology for students with Special Educational Needs
92. Has promoted organization of flexible groups in core subjects according to student learning rate
93. Teachers have increased student motivation thanks to methods used
94. Design of reinforcement plans and curricular adaptation is based on evaluation

95. An initial assessment is conducted at the start of each education cycle to determine each student's level
96. The school systematically prepares student evaluation reports at the end of each stage (primary, secondary, vocational training, etc.)
97. Evaluation criteria are specified taking into account improvement of learning achievements
98. Evaluation criteria are clearly specified for awareness by audiences involved
99. Students may access and review all activities evaluating their knowledge
100. Evaluation criteria are specified taking into account improvement of learning achievements
101. School conducts periodic assessment of evaluation systems applied by teachers
102. Assessment methods are changed, if necessary, after their evaluation
103. Tutoring activities are aimed at comprehensive education and personalised student attention
104. Tutoring actions conducted in school are systematically evaluated
105. Decisions are made according to evaluations completed to improve PAT
106. Provide your assessment, overall, of the impact the implementation of the Quality Plan has had on the Teaching-Learning Process in your school

V. SATISFACTION

107. Has increased level of teacher satisfaction
108. The level of student satisfaction has increased
109. Level of family satisfaction has increased
111. Assess, in general, the impact which you consider implementation of the Quality Plan has had on School Staff Satisfaction

VI. EXTERNAL RELATIONS

112. Increase in joint activities with other schools (through, recognition, etc.)
113. Improvement in systematic review of joint activities with other schools, according to the evaluation results, for their improvement
114. Increase in level of relations that the school has established with other organizations, such as banks, providers, etc.
115. Increase in benefits school obtains from relationships with the abovementioned organizations.
116. Improvement in design of plans and specific actions to strengthen or expand network with other institutions based on benefits obtained.
117. Increase in mobility and exchange programmes to enhance language learning.
118. Increase in mobility and exchange programmes to enhance sports.
119. Increase in mobility and exchange programmes to enhance participation in education competitions.
120. Improvement of actions to strengthen and expand student mobility and exchange agreements as a result of the evaluation of benefits obtained.
121. Improvement of school image and recognition in its community in the last three years.
122. Increase in the amount of recognition in the media
123. Increase of specific actions to improve school prestige.
124. Increase in the use of resources offered by the community (City Council, Community, corporations, etc.)
125. Implementation of evaluation of benefits of using community resources
126. Increase in preparation of specific plans and actions for optimization of community resources
127. Increase in community use of resources provided by the school (sports facilities, parking, etc.)
128. General assessment of impact that implementation of quality management system has had on school Relations