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Content Validation of an Instrument Used to Assess the Educational Quality of Blended Learning Courses

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Abstract: This article describes the content validation process of an instrument used to assess the educational quality of training designs based on the Blended Learning model. The Expert Judgement technique was applied, involving the participation of 11 judges who have been duly trained in the design, implementation, and assessment of the Blended Learning model. The judges assessed the items presented based on criteria of relevance and clarity. The level of inter-judge agreement was determined using the Coefficient of Variation (CV) and Kendall's W test. The results show significant agreement amongst the participating judges regarding the relevance and clarity of the items that comprise the proposed instrument. The development of this research provides the design of an instrument able to objectify and define the educational quality of Blended Learning from a global and systemic perspective. This research project will help ensure quality in designing and implementing educational processes in hybrid learning environments and educational transformation and improvement in higher education.

Keywords: blended learning, content validity, educational quality, expert judgement, higher education.

用於評估混合式學習課程教育質量的工具的內容驗證

摘要: 本文旨在描述用於評估基於混合學習模型的培訓設計的教育質量的工具的內容驗證過程。應用了專家判斷技術，涉及 11 名已在混合學習模型的設計、實施和評估方面接受過適當培訓的法官的參與。評委根據相關性和清晰度的標準對呈現的項目進行了評估。使用變異係數和檢驗確定法官間一致的水平。結果表明，參與的評委對構成擬議文書的項目的相關性和清晰度達成了重大共識。這項研究的發展提供了一種工具的設計，能夠從全球和系統的角度客觀化和定義混合式學習的教育質量。該研究項目將有助於確保混合學習環境中教育過程的設計和實施的質量，以及高等教育背景下的教育轉型和改進。

关键词： 混合學習、內容有效性、教育質量、專家判斷、高等教育。

1. Introduction

The integration of digital technologies as teaching tools has enabled different ways of combining strategies, resources, and learning experiences, making it possible to combine, blend and sometimes sequence the activity of teachers and students in face-to-face and virtual environments [1, 2]. The resulting diversity of formats has given rise to a new form of training known as blended learning (also referred to as ‘b-learning’ or ‘BL’) which is becoming increasingly popular, particularly in the field of higher education [3, 4, 5, 6, 7, 8].

The expansion of BL training systems has also given rise to an interesting range of new publications that seek to provide greater awareness of various aspects related to both the conceptualization and conceptual clarification of what this type of training can entail [9, 10, 11] and assessing its effectiveness compared to the exclusively face-to-face or virtual model insofar as barometers such as improved student performance and satisfaction, greater access to knowledge, the adaptation of the teaching process to the characteristics of the students, the construction of collaborative learning experiences and the promotion of proactive attitudes or student autonomy with regards to the management and organization of their learning, among others [2, 3, 5, 12, 13].

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A third main study focuses on a general evaluation of the degrees, courses, and subjects designed from this blended learning approach (face-to-face + virtual) [1, 3, 7, 14].

The study on educational quality in blended learning models is inferior to those carried out exclusively on virtual systems, where we can find models of educational qualifications such as those established by [16, 17, 18], as well as validated assessment instruments such as those presented by authors like [19, 20].

When reviewing the available literature on assessing the educational quality of blended learning environments, the first thing we find is a remarkable diversity of perspectives and approaches, each of which focuses on a particular aspect of quality or on the establishment of mechanisms that evaluate only a part of the implementation process [14, 21, 22]. To a lesser extent, other studies have sought to assess the quality of the BL model from a broader, systemic and multidimensional perspective, encompassing the different elements involved in its design and implementation [1, 23, 24].

Despite this recent literature that focuses on the evaluation of quality in blended learning environments, it is essential to gain a better understanding of the mechanisms used to evaluate blended learning and, above all, to have reliable and validated instruments that allow useful information to be gathered on the quality of the design and implementation of this type of educational model, taking into account the different elements that comprise it and the interaction that takes place between them. This paper presents the process that is carried out to validate the content of an instrument designed to measure higher education students' perception of the quality of b-learning courses, using a systematic feedback method between researchers known as a panel or expert judgment.

2. Materials and Methods

2.1. Participants

The study involved the participation of eleven experts (five men and six women) from different areas related to the field of education and university training. They all have more than five years of experience designing, implementing, and/or evaluating the blended learning model.

2.2. Procedure

The study's main objective was to validate an instrument that evaluates the educational quality of blended learning courses or subjects from the students' perspective.

The content validation method involves assessing the degree to which a construct's relevant and representative elements are included in a measurement instrument [25]. For this process, the participating judges were provided with a scale for evaluating the instrument's content, which defined the dimensions and factors included in the questionnaire as presented in Fig. 1.

A scale from 1 to 4 was used for the assessment, with one being “does not meet the criterion” and four “meets the criterion.” The assessment criteria used were relevance (the degree of importance and significance of the item regarding the dimension being assessed) and clarity (the students can understand the degree to which the language is used in the item).

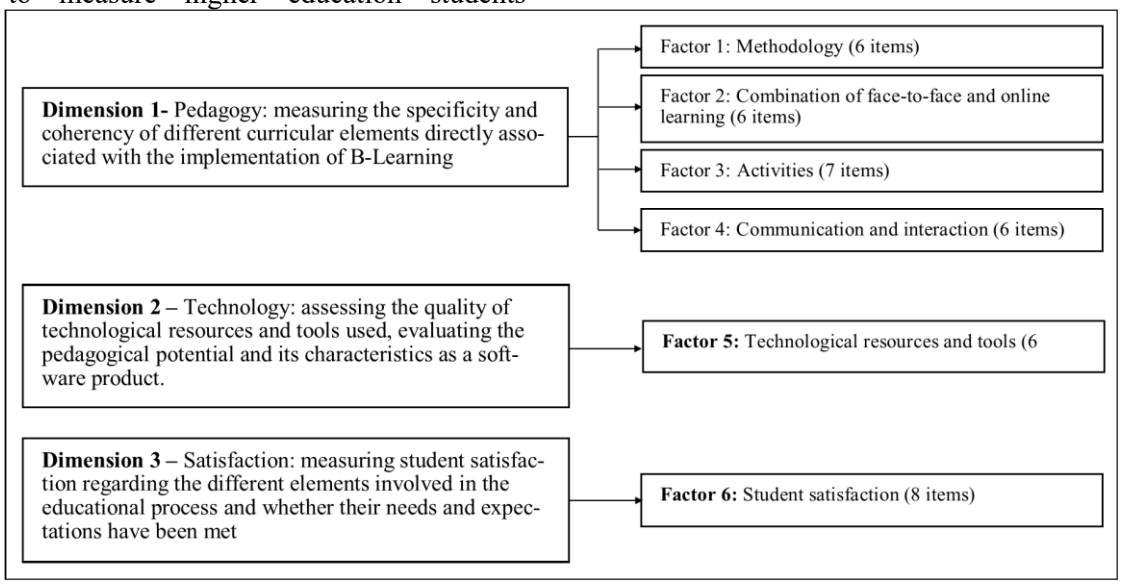

Fig. 1 Dimensions and factors of the questionnaire

Qualitative information related to the overall assessment of each of the dimensions and factors, the presentation and structure of the questionnaire, and suggestions and comments concerning the wording of the items were also collected. This type of information was collected through a series of open-ended questions.

The qualitative expert input allowed for a more thorough review of the instrument, which was useful for refining and identifying aspects of the items that needed

to be reworded. Through these suggestions, a series of elements to be considered during the final design of the instrument was also established. These were related to incorporating items related to the evaluation process, the teaching activity, the structure, and the psychometric aspects of the scale used.

Finally, following the established exclusion and review criteria based on the coefficient of variation (CV), item 18 was excluded, and items 1, 12, 25, 31, and 39 were reviewed. Following their review, items 1, 31, and 39 were excluded. Based on the qualitative assessment of the judges, items 6 and 13 were also excluded. Finally, for the final design of the questionnaire, the original wording of item 4 was maintained, 31 items were reworded, and six new items were added, leaving a total number of 41 items and two open-ended questions in the final design.

The coefficient of variation (CV), calculated as the quotient between the standard deviation and the mean of the individual expert responses, was used to quantify content validity. Owing to the coefficient being a measure of variation, higher values indicate a lower degree of agreement amongst judges, with scores of under 40% being considered an acceptable level of agreement [26, 27].

Items with more than 25% CV in the relevance criterion were considered unacceptable and were excluded from the questionnaire. Items with an inter-judge agreement percentage of 20-24% were reviewed to establish whether they should remain in the questionnaire. Regarding the clarity criterion, the rewording of items with more than 20% inter-judge agreement was reviewed, taking into account the comments made by the participating experts.

Data processing was carried out using the SPSS v.26 Statistical Analysis Program, which carried out a descriptive analysis to obtain the mean and standard deviation of the scores for the items, as well as Kendall's W test, in order to consolidate the results obtained through the CV in the global analysis of the instrument.

3. Results

The results of the first analysis carried out with the CV (Table 1) show high inter-judge agreement with regards to the validity of the instrument based on the established criteria, with this agreement being greater in the relevance criterion ($\overline{X}$ = 3.76; CV = 4.61%) than in the clarity criterion, presenting a higher percentage of variability in the judges' assessment ($\overline{X}$ = 3.55; CV = 13.63%). These results are reinforced by Kendall's W test, which shows significant consensus between expert assessments based on the criteria mentioned above.

Table 1 Overall average ratings of the instrument by criteria: relevance and clarity

	N	Mean	Std. Dev.	CV %	Kendall's W	p-valor.
Criterion of Relevance	11	3.76	0.174	4.61	.961	.000*
Criterion of Clarity	11	3.55	0.484	13.63	.917	.000*

*Level of significance .05
Source: Prepared by the author

Concerning the items corresponding to the Pedagogical Dimension, most of them demonstrate a high degree of inter-judge agreement for the relevance criterion; however, this degree of agreement decreases for the clarity of the wording of the items. In this block and based on the exclusion and review percentages established for the CV, item 18 will be excluded from the questionnaire, and items 1, 12, and 25 will be reviewed to establish whether or not they remain in the instrument.

In the first block of items corresponding to the Methodology Factor (Table 2), the aspect rated as most relevant by the experts is the influence of BL in improving students' motivation towards the subject ($\overline{X}$= 4; CV= 0.00%). This was followed by promoting autonomous student learning ($\overline{X}$= 3.91; CV= 7.72%) and collaborative student learning ($\overline{X}$= 3.91; CV= 7.72%).

The least relevant item was the effect of the BL model on improving certain curricular competencies in the students ($\overline{X}$= 3.55), with this item presenting a greater variability in the inter-judge evaluation according to the Coefficient of Variation (CV = 19.38%). Based on the qualitative input of the experts, this figure is due to the variety of curricular competencies that can be developed in the different subject areas and degrees.

Table 2 Assessment of the pedagogical dimension: Factor 1 – methodology

Items	Relevance (rel)				Clarity (cla)			
	N	Mean	Std. Dev.	CV %	N	Mean	Std. Dev.	CV %
Item 1. Improved your overall level in certain curricular skills that you have acquired throughout your learning (for example: reflection, decision making, conflict resolution, communication…)	11	3.55	0.688	19.38	11	2.73	1.191	43.63
Item 2. Encouraged self-regulation in your learning (for example: establishing priorities, planning tasks, organising studying of content…)	11	3.82	0.405	10.60	11	3.27	0.905	27.68
Item 3. Encouraged your autonomy in learning (for example: carrying out your own research and/or completing complementary tasks, clarifying doubts…)	11	3.91	0.302	7.72	11	3.45	0.934	27.07
Item 4. Encouraged group learning (for example: through interventions, debates, forums, chats, coursework…)	11	3.91	0.302	7.72	11	3.64	0.674	18.52
Item 5. Promoted your participation and involvement during the course	11	3.82	0.405	10.60	11	3.55	0.934	26.31
Item 6. Improved, in general, your motivation towards studying the subject	11	4	0	0.00	11	3.82	0.603	15.79

Source: Prepared by the author

For the Combination of face-to-face and virtual models (Table 3) factor, the judges deemed the items aimed at assessing the adaptation of BL subjects to the students' different learning methods and speeds to be highly relevant ($\overline{X}$ = 3.91; CV = 7.72%). They also highlighted the importance of a correct convergence and complementarity between the educational practices implemented in face-to-face and virtual environments ($\overline{X}$ = 3.82; CV = 10.60%) and the flexibility this model offers for organizing study time ($\overline{X}$ = 3.82; CV = 15.79%).

The aspect considered least relevant by the experts was the positive contribution of the BL model to the learning of content ($\overline{X}$ = 3.45; CV = 23.77%). In this case, the qualitative assessments of the majority of judges suggested that this item should be moved, stating it would be more relevant to the previous factor.

Table 3 Assessment of the pedagogical dimension: Factor 2 - combination of face-to-face and virtual models

Items	Relevance (rel)				Clarity (cla)			
	N	Mean	Std. Dev.	CV %	N	Mean	Std. Dev.	CV %
Item 7. The face-to-face and virtual classes (theoretical classes, coursework, activities…) displayed a clear sequencing between them	11	3.64	0.674	18.52	11	3	1	33.33
Item 8. The face-to-face and virtual classes (theoretical classes, coursework, activities…) complemented each other	11	3.82	0.405	10.60	10*	3.3	0.823	24.94
Item 9. The combination of face-to-face and virtual classes has offered you greater flexibility to choose your place of work and/or study	11	3.73	0.647	17.35	11	3.55	1.036	2918
Item 10. The combination of face-to-face and virtual classes has allowed you to distribute and organise your time in a more flexible way	11	3.82	0.603	15.79	11	3.27	1.104	33.76
Item 11. The combination of face-to-face and virtual classes has allowed you to adapt the subject development to your own pace and learning style.	11	3.91	0.302	7.72	10*	3.9	0.316	8.10
Item 12. The combination of face-to-face and virtual work has contributed positively to your learning of subject content	11	3.45	0.82	23.77	11	3.36	1.027	30.57

*Lost values: 1
Source: Prepared by the author

Regarding the Activities Factor (Table 4), the most relevant items correspond to improving the understanding of the content by carrying out activities in hybrid learning environments ($\overline{X}$= 4; CV= 0.00%), and the possibility of undertaking e-activities and face-to-face activities in order to apply theoretical knowledge to real and/or practical cases ($\overline{X}$ = 4; CV = 0.00%). On the other hand, the item considered to be least relevant by the judges was the one aimed at assessing the influence of b-learning on the application of different cognitive

strategies during the performance of the activities by the students ($\overline{X}$ = 3.55; CV = 26.31%).

Table 4 Assessment of the pedagogical dimension: Factor 3 – activities

Items	Relevance (rel)				Clarity (cla)			
	N	Mean	Std. Dev.	CV %	N	Mean	Std. Dev.	CV %
Item 13. Contributed to your achievement of objectives established in the subject	11	3.91	0.302	7.72	11	3.55	0.934	26.31
Item 14. Facilitated the connection of learning acquired throughout the course with learning already acquired	11	3.82	0.603	15.79	11	3.73	0.647	17.35
Item 15. Improved your understanding of subject content studied	11	4	0	0.00	11	3.91	0.302	7.72
Item 16. Allowed you to apply your theoretical knowledge to real and/or practical cases (for example: through case studies, role play, simulations, problem resolution, provision of services)	11	4	0	0.00	11	3.73	0.467	12.52
Item 17. Presented different degrees of difficulty (activities ranging from the most simple to the most difficult)	11	3.64	0.674	18.52	11	3.27	1.009	30.86
Item 18. Required you to apply different strategies (for example: summarising, understanding, analysis, assessment…)	11	3.55	0.934	26.31	11	3.36	1.027	30.57
Item 19. Encouraged, in general, critical and reflective thought on the various topics covered	11	3.91	0.302	7.72	11	3.55	1.036	29.18

Source: Prepared by the author

In the fourth factor, corresponding to Communication and Interaction (Table 5), the items rated as most relevant were the appropriateness of the interaction spaces proposed during the teaching of the subject ($\overline{X}$ = 4; CV = 0.00%), followed by teacher-student communication ($\overline{X}$ = 3.91; CV = 7.72%) and the positive impact of student-teacher communication on the students' learning ($\overline{X}$ = 3.91; CV = 7.72%).

The least relevant item was developing the feeling of companionship, which brought about the students' interaction with the rest of their peers $\overline{X}$ = 3.4; CV = 24.79%). In this item, the qualitative assessments highlight the relevance of this aspect. However, a more specific wording was advised which explains the meaning of the term "accompaniment."

Table 5 Assessment of the pedagogical dimension: Factor 4 - communication and interaction

Items	Relevance (rel)				Clarity (cla)			
	N	Mean	Std. Dev.	CV %	N	Mean	Std. Dev.	CV %
Item 20. The general approach to the subject has enabled you to interact with the rest of the group	11	3.73	0.467	12.52	11	3.91	0.302	7.72
Item 21. The approach to the subject has enabled you to communicate with the teacher	11	3.91	0.302	7.72	11	3.91	0.302	7.72
Item 22. Communication with your peers has contributed positively to your learning	11	3.73	0.647	17.35	11	3.91	0.302	7.72
Item 23. Communication with your teacher has contributed positively to your learning	11	3.91	0.302	7.72	11	3.91	0.302	7.72
Item 24. The different spaces for proposed interaction (classroom, chat messages, forum, email) have been sufficient for you to share information and/or knowledge with the others	11	4	0	0.00	11	3.82	0.405	10.60
Item 25. The interaction with the others has made you feel accompanied throughout the learning process	10*	3.4	0.843	24.79	10*	3.4	0.843	24.79

*Lost values: 1
Source: Prepared by the author

Concerning the items that make up the Technological Dimension (Table 6), we can once more observe a high level of agreement between the experts' evaluations in the relevance criterion. In this block, this level of agreement drops in the clarity criterion. Taking into account the CV of these items, no items were excluded. However, item 31 will be reviewed to establish whether it should remain in the questionnaire.

According to the scores allocated to the items belonging to the Resources and Technological Tools factor, the experts consider their ease of use to be very relevant ($\overline{X}$ = 4; CV = 0.00%), as well as their capacity to facilitate autonomous student learning ($\overline{X}$ = 4; CV = 0.00%). Meanwhile, the least relevant item was the usefulness of the student learning resources ($\overline{X}$ = 3.5; CV = 24.29%).

Table 6 Assessment of the pedagogical dimension: Factor 5 - resources and technological tools

Items	Relevance (rel)				Clarity (cla)			
	N	Mean	Std. Dev.	CV %	N	Mean	Std. Dev.	CV %
Item 26. You have found it easy to use the present resources on the platform (for example, wiki, lessons, videoconferencing…)	11	4	0	0.00	11	3.82	0.603	15.79
Item 27. The different formats in which the same content was presented (text, video, audio, presentations…) has enabled you to understand content better	11	3.64	0.674	18.52	11	3.55	0.934	26.31
Item 28. Technological resources have helped you to learn in an autonomous way (for example: information access and search, material organisation, completion of study materials…)	11	4	0	0.00	11	3.82	0.603	15.79
Item 29. The technological tools have facilitated group work (for example: study and/or work meetings, communication, material exchange…)	11	3.91	0.302	7.72	11	3.64	0.674	18.52
Item 30. The technological resources have allowed for the subject to be tailored to suit individual learning (for example: adaptation to your knowledge level, abilities, interests and educational and/or personal needs…)	11	3.64	0.674	18.52	11	3.45	0.82	23.77
Item 31. The technological resources, in general, have been useful for your learning	10*	3.5	0.85	24.29	10*	3.4	0.966	28.41

*Lost values: 1
Source: Prepared by the author

Finally, in the third block of items belonging to the student satisfaction dimension and based on the results obtained after analyzing the CV (Table 7), no exclusion is made here either. However, item 39 will be reviewed to establish whether it should remain in the questionnaire.

The items of this factor are notably relevant, with the most relevant one being that aimed at assessing student satisfaction with the combination of face-to-face and virtual classes ($\overline{X}$ = 3.9; CV = 8.10%). The least relevant items were those aimed at assessing the students' satisfaction with the competencies acquired ($\overline{X}$ = 3.73; CV = 17.35%) and the general development of the subject ($\overline{X}$ = 3.73; CV = 24.26%), as well as the item referring to the extent to which the students' expectations of the subject were met ($\overline{X}$ = 3.73; CV = 17.35%).

Table 7 Assessment of the student satisfaction dimension: Factor 6 - student satisfaction

Items	Relevance (rel)				Clarity (cla)			
	N	Mean	Std. Dev.	CV %	N	Mean	Std. Dev.	CV %
Item 32. The skills acquired in the development of the subject	11	3.73	0.647	17.35	11	3.64	0.924	25.38
Item 33. The fulfilment of your expectations towards the course	11	3.73	0.647	17.35	11	3.91	0.302	7.72
Item 34. The methodology of the subject	11	3.82	0.603	15.79	10*	3.7	0.483	13.05
Item 35. The combination of face-to-face and online classes	10*	3.9	0.316	8.10	10*	3.9	0.316	8.10
Item 36. The activities completed	11	3.82	0.405	10.60	11	3.64	0.674	18.52
Item 37. The communication throughout the development of the subject	11	3.82	0.405	10.60	11	3.91	0.302	7.72
Item 38. The technological resources used	11	3.82	0.405	10.60	10*	3.9	0.316	8.10
Item 39. The general development of the subject	11	3.73	0.905	24.26	11	3.64	0.924	25.38

*Lost values: 1
Source: Prepared by the author

Other aspects assessed in the validation instrument are related to the overall validity and appropriateness of the instrument (Table 8). The first aspect is understood as the degree to which the given dimensions, taken

together, can explain the quality of a blended learning course. Meanwhile, the second aspect is understood as the degree to which the questionnaire fits the purpose for which it has been designed.

Table 8 Assessment of global validity and appropriateness of the questionnaire

	N	Mean	Std. Dev.	CV %
Overall validity	10*	3.60	0.516	14.33
Suitability	10*	3.80	0.422	11.11

*Lost values: 1
Source: Prepared by the author

Considering these results, it can be stated that the experts consider that the instrument designed has broad validity ($\overline{X}$ = 3.60; CV = 14.33,00%) and is, therefore, suitable ($\overline{X}$ = 3.80; CV = 11.11%) for evaluating the educational quality of subjects taught through a blended learning model.

4. Discussion

The analysis has enabled us to validate an instrument for measuring the quality of training in BL environments based on three dimensions: pedagogy, technology, and personal satisfaction with the training received and six main factors.

In the first factor of the pedagogical dimension, methodology, the experts considered motivation, autonomy, and collaborative learning to be the most important aspects of the instrument. This result is in line with other studies that highlight the importance of developing a blended learning methodology that favors autonomy and self-regulation of learning [1, 28], as well as the promotion of participation and collaborative work for the construction of knowledge and the student's motivation towards the learning process [29].

The second factor highlights the combination of face-to-face and virtual learning models. In line with the available literature [23, 30], the quality of the BL environment requires a clear convergence between face-to-face and virtual activity, creating a meaningful flow from one environment to the other while providing learners with different means of accessing content and constructing knowledge. In this factor, aspects related to flexibility in terms of time and space provided by the blended learning model for teaching and learning [1, 22], as well as the capacity of this model to adapt the training process to the characteristics, rhythms, and needs of the students [23, 31], have also been favorably looked upon.

About the factor referring to activities, the experts appreciated that these help students understand the content being taught and provide meaningful and collaborative learning experiences adapted to the environment in which they are being carried out. These elements coincide and are found in other instruments and studies related to the quality of learning environments, both online and face-to-face [1, 30, 31].

Concerning the last factor of the pedagogical dimension, interaction, and communication, the experts have highlighted it. The fostering of communicative and relational processes influences the improvement of social presence, generating an enriched collaborative learning environment, which promotes the development of feelings of belonging to the group, which is a support system for students both inside and outside the classroom [1, 3, 14, 23, 30, 31, 32].

For the second dimension of the questionnaire, the technological dimension, the quality of these types of resources and tools must be addressed from two perspectives: pedagogical and technical. From the first perspective, these instructional materials and environments should play a facilitating and mediating role in constructing learning, providing students with different means to access and construct their knowledge [32]. For this, from the second perspective, some authors [1, 3, 14, 28, 29, 30] state that the characteristics related to accessibility, usability, and ease of use of technologies for both students and teachers are fundamental in establishing the level of effectiveness and quality of the blended learning model.

Finally, as for the dimension related to student satisfaction, the judges agree to include this dimension as the main axis for measuring the quality of blended learning programs. Along the same lines, different authors relate student satisfaction to different aspects present in the design of the educational process, such as the methodology, the results obtained, the resources and virtual spaces used, the learning climate, student-student and student-teacher interaction, and fulfillment of expectations [4, 22, 23, 28, 29, 30].

5. Conclusion

This study's primary aim is to validate an instrument designed to assess the educational quality of courses or subjects using the Blended Learning approach from a student perspective. This research is particularly relevant due to the scarce availability of tools designed to assess the educational quality of the BL model, as it is a subject rarely addressed by the research community. This, in part, could be because the evaluation of hybrid learning models (b-learning) presents a considerable challenge, given the difficulty of identifying the specific attributes of the two scenarios (face-to-face + virtual) that comprise them. This involves establishing a clear conceptualization of what is understood by Blended Learning modality and the identification and definition of the elements that constitute the approach. After carrying out a literary review on literature specializing in BL, to establish which theoretical components of the construct to measure on the one hand and the validation process by the experts on the other, we have been able to successfully design a tool capable of objectifying and defining educational quality in Blended Learning

environments. This is carried out from a global and systemic perspective encompassing the different dimensions and sub-dimensions present in said environments and their interrelationships.

In addition to the difficulties mentioned above, among other limitations, there is the added difficulty of conceptualizing and operationalizing what is understood by educational quality. The difficulties entailed are particularly increased at the higher education level due to the wide range of education on offer and its different approaches to education. Due to this, it is not easy to provide a specific answer to questions such as to what extent and when should we speak of quality education and how we should measure this quality.

In this sense, the need and usefulness of instruments used to assess the quality of higher education training processes from a multidimensional perspective of quality, attending to aspects such as effectiveness, efficiency, functionality, and equity, is therefore evident. Considering this need, further research is needed to develop the psychometric validation of the tool, evaluate and measure the structure of the proposed dimensions and factors, and test the internal consistency of both the tool as a whole and its dimensions and factors.

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