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## Cross-cultural adaptation of the Questionnaire to evaluate the quality of PBL problems for use in Brazil.

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### ABSTRACT

**Introduction:** The tutorial groups contribute to active learning, in Problem-Based Learning, stimulating the student to develop critical-reflective reasoning and autonomy, directing him to the construction of skills necessary for the future profession. For such a theoretical construction to be effective, the problems that guide the tutorial groups must be properly evaluated in order to guarantee their quality. Thus, the present study aims to adapt the Questionnaire to evaluation the quality of PBL problems for Brazilian Portuguese. **Method:** Methodological study of cross-cultural adaptation. The steps were followed: conceptual equivalence of items, translation, synthesis of translations, back-translation, resynthesis, evaluation by the expert review and pre-test committee. The committee was composed of a sample of 7 specialists and the pre-test by 111 undergraduate students in Nursing. The data were analyzed using the SPSS® software, verifying measures of dispersion and central tendency. Reliability was verified using Cronbach's alpha. **Results:** Translations, synthesis, back-translations and resynthesis were carried out in order to culturally adapt the instrument and preserve the content of the original version. The committee of judges proposed substitutions for synonyms of more common words in higher education, as well as adjustments to favor verbal agreement and coherence. In the pre-test, the questions were analyzed when they were clear, all had a mean higher than 3. Cronbrach's alpha ranged from 0.73 to 0.89. **Conclusion:** The process of cross-cultural adaptation followed all stages systematically based on the literature. Therefore, the Questionnaire to evaluation the quality of PBL problems is adapted for use in Brazil.

### KEYWORDS

Translation. Higher education. Learning.

## Adaptação transcultural do Questionnaire to evaluation the quality of PBL problems para uso no Brasil.

### RESUMO

**Introdução:** Os grupos tutoriais contribuem para aprendizagem ativa, na Aprendizagem Baseada em Problemas, estimulando o estudante a desenvolver raciocínio crítico-reflexivo e autonomia, direcionando-o à construção de competências necessárias a futura profissão. Para que tal construção teórica seja efetiva, os problemas, norteadores dos grupos tutoriais, devem ser avaliados adequadamente a fim de garantir sua qualidade. Deste modo o presente estudo objetiva-se em adaptar o *Questionnaire to evaluation the quality of PBL problems* para o português brasileiro.

**Método:** Estudo metodológico de adaptação transcultural. Foram seguidas as etapas: equivalência conceitual dos itens, tradução, síntese das traduções, retradução, resíntese, avaliação pelo comitê de especialista de revisão e pré-teste. O comitê foi composto por uma amostra de 7 especialistas e o pré-teste por 111 estudantes de graduação em Enfermagem. Os dados foram analisados pelo software SPSS®, verificando-se medidas de dispersão e tendência central. A confiabilidade foi verificada por meio do alfa de Cronbach. **Resultados:** Foram realizadas traduções, síntese, retraduições e resíntese buscando adequar culturalmente o instrumento e preservando o conteúdo da versão original. O comitê de juízes propôs substituições por sinônimos de palavras mais usuais no ensino superior, assim como ajustes para favorecer a concordância verbal e coerência. No pré-teste as questões foram analisadas quanto a sua clareza, todas tiveram média maior que 3. O alfa de Cronbach variou entre 0,73 a 0,89. **Conclusão:** O processo de adaptação transcultural seguiu todas as etapas sistematicamente baseada na literatura. Sendo assim, o *Questionnaire to evaluation the quality of PBL problems* encontra-se adaptado para uso no Brasil.

### PALAVRAS-CHAVE

Tradução. Ensino Superior. Aprendizagem

## Adaptación transcultural del Questionnaire to evaluate the quality of PBL problems para su uso en Brasil.

### RESUMEN

**Introducción:** Los grupos tutoriales contribuyen al aprendizaje activo, en Aprendizaje Basado en Problemas, estimulando al alumno a desarrollar el razonamiento crítico-reflexivo y la autonomía, dirigiéndolo a la construcción de habilidades necesarias para la futura profesión. Para que dicha construcción teórica sea efectiva, los problemas que orientan a los grupos tutoriales deben ser evaluados adecuadamente para garantizar su calidad. El presente estudio tiene como objetivo adaptar el Cuestionario para evaluar la calidad de los problemas de PBL para el portugués brasileño. **Método:** Estudio metodológico de adaptación transcultural. Se siguieron los pasos: equivalencia conceptual de ítems, traducción, síntesis de traducciones, retrotraducción, resíntesis, evaluación por el comité de revisión de expertos y pre-test. El comité estuvo compuesto por 7 especialistas y el pre-test por 111 estudiantes de pregrado en Enfermería. Los datos fueron analizados mediante el software SPSS®, verificando medidas de dispersión y tendencia central. La confiabilidad se verificó mediante el alfa de Cronbach. **Resultados:** Se realizaron traducciones, síntesis, retrotraducciones y resíntesis con el fin de adecuar culturalmente el instrumento y preservar el contenido de la versión original. El comité de jueces propuso sustituciones por sinónimos de palabras más comunes en la educación superior, así como ajustes para favorecer la concordancia verbal y la coherencia. En la prueba previa, las preguntas se analizaron cuando estaban claras, todas tenían una media superior a 3. El alfa de Cronbach osciló entre 0,73 y 0,89. **Conclusión:** El Cuestionario para evaluar la calidad de los problemas de PBL está adaptado para su uso en Brasil.

### PALABRAS CLAVE

Traducción. Enseñanza superior. Aprendizaje

#### CRedit

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## 1 Introduction

In active teaching-learning methodologies, especially Problem-Based Learning (PBL), the student has an active role in the search for knowledge, which is stimulated to analysis, discernment, and critical reflection. The theoretical construction of PBL learning is student-centered and structured around small groups, called tutorial groups, consisting of 8 to 12 students and a tutor who acts as a facilitator. The learning process is initiated, oriented, and structured by means of problem solving, which is elaborated by the teachers based on the curricular contents proposed in the course curriculum, relating it to daily life and/or clinical case reports, phenomena, or events that need explanation. In this way, the student gradually builds the necessary knowledge to solve real problems present in the future of the chosen profession (BORGES et al., 2014); (MOALLEM, HUNG, DABBAGH, 2019).

For Hung (2016), the problem designer not only drives the construction of the learning objectives but also interferes in the whole learning process in GPA. A priori, it contextualizes the content knowledge and provides a workspace for students to apply the knowledge. In this way, when students encounter a problem in their practice scenario, they will know how to apply the knowledge they already have and identify the knowledge they lack.

For a satisfactory design, the problem should challenge and stimulate the student to learn, matching his or her prior knowledge, be authentic, interesting, and present stimulating guidelines and clues for analyzing thinking and reasoning. It should also stimulate individual study, contextualizing the abstract knowledge of the content into practical knowledge. Among its purposes are led students to achieve the learning objectives, involve them in discussions and stimulate their interest for self-directed learning (BORGES et al., 2014); (BOROCHOVICIUS, TORTELLA, 2014).

Moreover, the problem is a significant component for effective learning in GPA, and it is imperative to ensure its quality (BORGES et al., 2014).

Given the relevance of problems for GPA learning and the growing number of Brazilian undergraduate and graduate institutions seeking innovative teaching-learning methods to break with traditional models, it was necessary to seek experimentally proven instruments that could assess the quality of problems. Some studies stood out in the literature.

"A protocol to assess the curricular validity of cases for PBL" by Kanin and Hawkins (1997) was the first published instrument to evaluate problems, observing the relationship between the content to be studied and the proposed learning objectives. In this study, it was emphasized the analysis of the relationship between the learning objectives and the curricular content that is inserted, not evaluating other assumptions relevant to the problem in the tutorial group. The same limitation was observed in the study "Validation of a short questionnaire to assess the degree of complexity and structuredness of PBL problems" by

Jacobs et al (2003), proposed an assessment of the structure and complexity of the problems used in the tutorial groups.

Finally, Munshi, Zayat, Dolmans (2008) conducted a study entitled "Development and utility of a questionnaire to evaluate the quality of PBL problems" in which a questionnaire analyzing the quality of problems based on the main theoretical assumptions of PBL was developed. The instrument comprises 6 factors: stimulates thinking, analysis, and reasoning; stimulates self-directed learning; leads to the study of the intended content; improves interest in the subject; relevance to the future profession in a realistic context; corresponds to the level of prior knowledge. Each factor has its theme detailed in items, totaling 18 items. The response alternatives follow a scale of agreement gradation ranging from 1 (strongly disagree) to 5 (strongly agree).

Since the study proposed by Munshi, Zayat, Dolmans (2008) is the most recent publication among the studies analyzed and supports a complete evaluation of the problems, it was decided to deepen the studies on it.

The existence of this instrument in the vernacular language will allow the strengthening of the method, ensuring that problems are built based on its theoretical assumptions, as well as facilitating the construction of problems acting as a guide for the evaluation of their quality.

In this sense, seeking empirical support and recognizing the satisfactory instrument "Questionnaire to evaluate the quality of the PBL problems" developed in the study by Munshi, Zayat, Dolmans (2008), it was decided to adapt it to Brazilian Portuguese, which is the objective of this study.

## 2 Methods

### 2.1 Study type

This is a methodological study of cross-cultural adaptation to adapt the Questionnaire to evaluate the quality of PBL problems to the Portuguese-Brazilian language.

### 2.2 Study Setting, Population, Sample, and Eligibility Criteria

The study took place at the Faculdade Pernambucana de Saúde - FPS, a private institution that uses PBL in a comprehensive way in all courses, namely: medicine, dentistry, nutrition, physiotherapy, psychology, and nursing.

In two stages of the adaptation process there was sample selection, which will be described separately.

The sampling for the selection of the judges was of the convenience type. Thus, the

researchers sought in their network of contacts professionals who had recognized expertise in adaptation studies and proven theoretical-practical knowledge in PBL. Portuguese-speaking experts were also recruited.

The sample for the number of judges participating in this step followed the literature recommendations composed of two experts in Portuguese language, two in psychometric measures and adaptation studies, and three in education with experience in GPA. (REGNAULT AND HERDMAN, 2015); (GUILLEMIN, BOMBARDIER AND BEATON, 1993); (REICHEINHEIM AND MORAES, 2007); (GÓIS, 2018).

An invitation letter was sent via email to all selected judges, clarifying the purpose of the study and the version object of the study for prior analysis. As well as scheduling day and time of the face-to-face meeting.

All the guests, initially selected, agreed to participate, and signed the Informed Consent Form (ICF).

In the selection of participants for the pre-test, the choice for the nursing course was made by convenience, since the researchers are linked to this course.

Thus, the population was composed of students regularly enrolled in the undergraduate nursing course, totaling 130 students.

The selection of this sample initially followed the criteria established in the original study (object of the cross-cultural adaptation): students from health courses who experience the PBL methodology in its entirety in the curriculum and are familiar with problems. Based on the criteria previously established, a sampling plan was built including all students enrolled from the 2nd to the 10th period in the undergraduate nursing course. This same inclusion factor was employed in the original study by Munshi, Zayat, Dolmans (2008).

Students from the 1st period were excluded from the study because they were still adapting to the method, as well as students enrolled in other periods who had entered that semester, transferred from other institutions, for at least one reason related to the adaptation process. A sample of 111 participants was obtained.

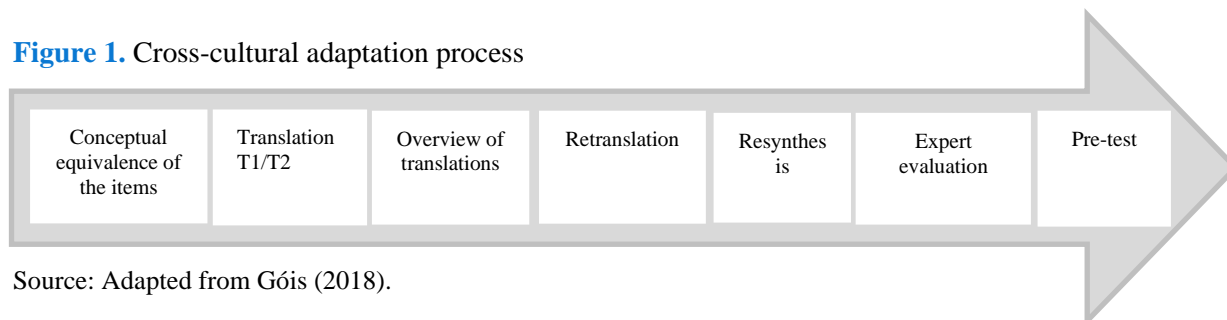
### **2.3 Theoretical and methodological framework**

For the cross-cultural adaptation process, it was assumed that the geographic context and culture may interfere in the way each concept is interpreted, fitting cross-cultural equivalence adaptations (REGNAULT AND HERDMAN, 2015).

The adaptation steps were carried out in a systematic way based on the recommendations of relevant literature: Regnault and Herdman (2015); Guillemin,

Bombardier, and Beaton (1993); Reichenheim and Moraes (2007). As illustrated in figure 1 by Góis (2018).

**Figure 1.** Cross-cultural adaptation process



Source: Adapted from Góis (2018).

## 2.4 Conceptual equivalence of the items

In this stage a literature review was performed, searching for articles in Portuguese, to consolidate basic concepts about PBL and the construction of the problems used in the tutorial groups, described in the literature.

This step aimed at fomenting the theoretical basis of the researchers.

## 2.5 Translation of the instrument into Brazilian Portuguese

The translation of the Questionnaire to evaluate the quality of PBL problems into Portuguese was done individually by two independent translators of Brazilian nationality and licensed in English. The first two versions were T1 and T2.

## 2.6 Overview of translations

Afterwards, the translators compared their translated versions and made a synthesis, elaborating a single consensus version, searching for terms and words they considered more appropriate.

## 2.7 Back translation

The consensual version built in the previous step was retranslated into English by two translators who were native speakers of English and qualified in Portuguese. Producing the B1 and B2 versions.

## 2.8 Resynthesis

A fourth bilingual translator formally verified the equivalence of the original version of the Questionnaire to evaluate the quality of PBL problems with the two versions (B1 and B2) produced in the previous step and built a synthesis. After checking the possible divergences between the synthesis and the original construct. The same translator responsible for this step retranslated this last version into Portuguese.

## 2.9 Expert evaluation

This step aimed to evaluate idiomatic and content equivalence by a committee of experts formed by two Portuguese-speaking experts, two in psychometric measurements and adaptation studies and three in education with experience in PBL.

The discussion started when all the guests were present, through the reading aloud of each item by the responsible researcher, and then the space was opened for each expert's considerations. This was followed only by the subsequent item after consensus was reached among the entire group.

## 2.10 Pre-test

Finally, 111 students evaluated the version produced by the expert committee to check their understanding of each question. The students analyzed item by item, checking on a Likert scale their level of understanding of each statement, with 1 not at all understandable and 5 fully understandable.

## 2.11 Data tabulation and analysis

Data were double entered into Microsoft Excel®, version 2013 and, with the help of a professional statistician, analyzed using SPSS (Statistical Package for the Social Sciences)®, version 22.

The means and standard deviation were checked individually for each item.

As for the evaluation of reliability, the internal consistency was measured by means of Cronbach's alpha coefficient. It is considered that the ideal interval of alpha values is between 0.7 and 0.9 (TERWEE, 2007).

Thus, when facing an instrument with several sub-components (factors), the alpha was calculated individually for each factor, since there are theoretically several constructs in question.

## 2.12 Ethical aspects

The study complied with Resolution 466/2012, which refers to research involving human beings, having approval from the Ethics Committee of the Faculdade Pernambucana de Saúde- PE, CAAE no19150213.9.0000.5569.

To carry out the study, authorization was also obtained from the author to use the original instrument, and all participants signed the Informed Consent Form (ICF) in two copies.



### 3 Results and discussion

Hung (2016), highlights that the problem is an essential part of Problem-Based Learning, not only for the student to identify the learning objectives but that its designer is related to the whole learning process in GPA. However, there are still few studies that explore, develop, and test its construction

In the daily life of PBL tutorial groups, the teachers' concern about the effectiveness of the problem is recurrent. Because there is no guiding tool or model, many times the effectiveness of the problem is only known after it has been used. And if it is not functional, it will be reformulated. However, the damage to the students who are faced with a problem that presents weaknesses will not be recovered. It's up to the tutor to intervene more, to fulfill the assignment that would be the problem.

For Hung, Mehl, & Holen (2013) the relevance of the tutor is indisputable but placing the entire facilitation process on him or her may compromise the construction of learning. In the case of difficult or vague problems for the student's level, there is a risk of the student developing dependence on the facilitator, compromising PBL premises such as critical thinking and student autonomy.

The instrument presented by Munshi, Zayat, Dolmans (2008) proposes to evaluate the quality of problems in a quick way, with an uncomplicated structure that is easily understood by teachers and students. Its cross-cultural adaptation is of excellent value for those who work with PBL.

It is known that the process of adapting an instrument to another language must consider cultural, social, and linguistic issues in addition to the specific terminologies of the subject matter. Many times, some minor distortions may be found. Thus, a thorough work is necessary to enable an effective understanding by the population under study, without distorting the ideas of the original version (SOUZA APR, MARQUES JM, SCOTT, 2010).

In this perspective, considering the needs of cultural, semantic, and linguistic adaptations, we followed the steps based on the recommendations of (REGNAULT AND HERDMAN, 2015); (GUILLEMIN, BOMBARDIER, AND BEATON, 1993); (REICHEINHEIM AND MORAES, 2007); (GÓIS, 2018).

#### 3.1 Conceptual equivalence of the items

The researchers conducted a free review in databases to deepen their knowledge regarding the basic concepts about GPA and the problems. This step was satisfactory since the researchers already had theoretical and practical experience with the method. Therefore, a systematic review was not necessary.



### 3.2 Translation, synthesis of translations, retranslation, and resynthesis

In the first version there were some divergences between the versions of the two independent translators (T1/T2). The title of the questionnaire with the acronym PBL was not translated by one of the translators. And the Likert scale, representing the number 2, was translated as: I do not agree, and I disagree.

In the consensus version (synthesis of the translations), the translators chose to use the PBL translated form, justifying that in Brazil the translated form of the Problems Based Learning (PBL) method is used for Problem Based Learning (PBL). As for the Likert scale, the form I disagree was adopted for number 2.

Still in the synthesis of the translations, when analyzing each item it was noticed the use of similar words, however, the ones that were closest to the semantics proposed in each statement were adopted in the consensus version, as in items: 2, 3, 4, 6, 12, 13, 17. Chart 1 shows the original version, still in English, and the consensus version, which was produced by the translators.

**Table 1:** Evaluation of semantic equivalence -Translation of the Questionnaire to evaluate the quality of PBL problems.

Original document	Overview of translations
1. <i>The problem is open enough to sustain discussion</i>	O problema é suficientemente aberto para sustentar uma discussão
2. <i>The problem provides optimal directions for discussion (i.e. not too many or too few)</i>	O problema fornece instruções ideais para a discussão (nem muitas, nem poucas)
3. <i>The problem contains appropriate stimulating cues</i>	O problema contém pistas que estimulam o usuário/aluno a resolvê-lo.
4. <i>The problem stimulates students to formulate their various learning issues</i>	O problema estimula os alunos a formular seus diversos problemas de aprendizagem
5. <i>The problem stimulates students to search for relevant literature</i>	O problema estimula os alunos a buscar a literatura relevante
6. <i>The problem stimulates students towards an effective discussion</i>	O problema estimula os alunos em direção a uma discussão efetiva
7. <i>The problem is formulated to guide to one or more of the general block objectives</i>	O problema é formulado para guiar a um ou mais objetivos gerais do conteúdo programado
8. <i>The problem encourages integration of various disciplines</i>	O problema encoraja a integração das diversas disciplinas
9. <i>The problem encourages to consult literature linked to block objectives</i>	O problema encoraja a consulta à literatura relacionada aos objetivos do conteúdo programado
10. <i>The problem is formulated in such a way that it enhances students` interest in the subject matter</i>	O problema está formulado de tal forma que ele aumenta o interesse dos alunos pelo assunto
11. <i>The problem is phrased to students` perception of their own environment and culture</i>	O problema é elaborado para a percepção dos alunos de seu próprio meio ambiente e cultura
12. <i>The scenario in the problem appears appealing to students.</i>	O cenário do problema parece atraente aos alunos

13.	<i>The problem shows clear linkage to the future profession</i>	O problema demonstra clara conexão com a futura profissão.
14.	<i>Basic science concepts are presented in a context of a clinical problem</i>	Conceitos básicos de ciência são apresentados num contexto de um problema clínico.
15.	<i>The problem is related to a patient not to a disease only</i>	O problema está relacionado a um paciente e não somente a uma doença.
16.	<i>The problem adapts to the level of the student's prior knowledge</i>	O problema se adapta ao nível do conhecimento prévio do aluno.
17.	<i>The problem is in alignment with the curricular material previously covered</i>	O problema está de acordo com o conteúdo curricular previamente trabalhado.
18.	<i>Students are familiar with part of the knowledge necessary for discussing the problem</i>	Os alunos estão familiarizados com parte do conhecimento necessário para a discussão do problema.

Source: The authors.

In the process of retranslation, the title of the questionnaire presented divergence from the original version in the use of the term's evaluation and assessment, it is inferred that the native English translator did not pay attention to the difference in the use of the expressions, since both are about evaluation, however used in different situations.

However, during the resynthesis, the translator identified this divergence and opted to use the noun evaluation.

Both educators use terms. Assessment provides feedback on knowledge, skills, attitudes, and work products with the aim of raising future performance. Evaluation is used to determine the level of quality of a performance or outcome and enables decisions to be made based on the level of quality demonstrated. These two processes are complementary and necessary for education but are not synonymous (BAEHR, 2010).

Since this is a retranslation, where previously the expressions had already been adapted to textual coherence, it is common to find such divergences that have been solved in the resynthesis.

### 3.3 Committee of judges: semantic analysis and construct analysis.

Seven judges, experts in the fields of education with experience in PBL, psychometric measures and instrument adaptation, and linguistics, participated in this stage.

All judges previously received and analyzed the consensus version produced by the translators. We opted for a face-to-face meeting with all judges to exchange knowledge and foster discussions in different areas. Thus, all items were discussed and exhausted only when there was consensus.

The term "cases/problems" was adopted in the title because it is a commonly used expression in the PBL method and to avoid ambiguities that the term "problems" could cause.

Problem-Based Learning" was also removed, leaving only the acronym PBL due to its common use.

In the Likert-type scale, the number 1 defined as "strongly disagree" was replaced by "strongly disagree" and the number 3 was changed from "neutral" to "neither agree nor disagree".

In all statements the term "pupils" was replaced by "students", as well as "subjects" was replaced by "contents", "blocks" by "modules" and "learning problems" by "learning objectives". In all these cases, these were adaptations referring to nomenclatures adopted by the PBL method.

Questions 3, 6, 11,14,17,18 were changed in order to maintain coherence, semantics, and verbal and nominal agreement, as shown in table 2.

**Table 2.** Comparison between the resynthesis and version after the judges' committee.

Resynthesis		Version after judges committee
1.	The problem is open-ended enough to support a discussion.	The case/problem provides ideal instructions
2.	The problem provides optimal directions for discussion (not too many, not too few.)	for discussion (Not too much, not too little)
3.	The problem contains clues that stimulate the user/student to solve it.	The case/problem contains appropriate stimulating clues.
4.	The problem encourages learners to	The case/problem stimulates the students to formulate the various learning objectives of the group
5.	formulate their various learning problems	The problem stimulates the students to
6.	The problem stimulates the learners to	formulate their various learning problems
7.	formulate their various learning problems	The case/problem is formulated to guide to one or more of the overall module objectives
8.	The problem stimulates learners toward effective discussion	The case/problem stimulates the integration of the various contents
9.	The problem is formulated to guide to	The case/problem is formulated in such a way
10.	The problem is formulated in such a way that it increases the students' interest in the subject	The case/problem is formulated in such a way that it increases the students' interest in the subject
11.	The problem is designed to	The case/problem allows the student's perception of the environment and culture
12.	the students' perception of their own environment and culture	The scenario of the case/problem seems attractive to the students
13.	The problem scenario appears attractive to the students	Basic health concepts are presented in the context of a clinical case/problem
14.	The problem shows a clear connection to the future profession	The case/problem is related to a patient, not just a disease
15.	Basic science concepts are presented in the context of a	The case/problem is adapted to the level of prior knowledge of the students

16.	clinical problem.	The case/problem allows the students to
17.	The problem is related to a patient, not just a disease	to identify some of the knowledge needed to discuss the problem
18.	The problem adapts to the level of the learner's prior knowledge.	Basic health concepts are presented in the context of a clinical case/problem.

Source: The authors.

### 3.4 Pre-test

After the changes recommended by the committee of judges, the instrument was analyzed by a sample of 111 undergraduate nursing students in order to verify the level of understanding of students regarding the statements proposed in the instrument.

For this, the gradation scale was maintained, changing the nomenclature to the degree of understanding, since the objective of the pre-test was to analyze the instrument itself. Following the gradation presented in chart 3.

**Table 3.** Items of the intangibility scale.

Level of intangibility	Description for reading
Not at all understandable	I don't understand any words or the message you are saying.
Not at all understandable	I understand a few words with difficulty but not the meaning of the message.
Understandable	I understand a few words well enough to understand most of the message.
Very understandable	I can understand most of the words and the message
Fully understandable	I can understand all the words and all the messages.

Source: Adapted from Souza, Marques, and Scott (2010).

After that, a quantitative analysis was performed by identifying the means and standard deviation.

**Chart 1.** Mean and Standard Deviation of the Questionnaire to evaluate the quality of PBL problem-Brazilian version.

		<b>Media ± DP</b>
	<b>Factor 1: Stimulates Thinking, Analysis, and Reasoning</b>	
1	The problem is open enough to support a discussion	3,46 ± 1,16
2	The problem provides ideal instructions for the discussion (not too much, not too little)	3,53 ± 0,99
3	The problem contains appropriate stimulating suggestions	3,39 ± 1,00
	<b>Factor 2: Stimulates Self-Directed Learning</b>	
4	The problem stimulates students to formulate their various Learning	3,95 ± 1,02
5	The problem stimulates students to search for relevant literature	3,95 ± 1,02
6	The problem stimulates students toward an effective discussion	3,93 ± 0,99
	<b>Factor 3: Leads to Study of Intended Content</b>	
7	The problem is formulated to guide to one or more of the block objectives General	3,60 ± 1,12
8	The problem encourages the integration of the various disciplines	3,86 ± 0,97
9	The problem encourages consulting the literature related to the block objectives	3,89 ± 1,06
	<b>Factor 4: Improves Interest in the Subject</b>	
10	The problem is formulated in such a way that it increases the students' interest in the subject	4,04 ± 1,02
11	The problem is designed for students' perception of their own environment and culture	3,77 ± 1,07
12	The problem scenario looks attractive to students	3,76 ± 1,05
	<b>Factor 5: Relevance to Future Profession with Realistic Context</b>	
13	The problem shows clear connection to the future profession.	4,10 ± 1,02
14	Basic science concepts are presented in the context of a clinical problem.	3,78 ± 1,12
15	The problem is related to a patient and not only to a disease.	3,96 ± 1,10
	<b>Factor 6: Corresponds to the Level of Prior Knowledge</b>	
16	The problem adapts to the level of the student's prior knowledge.	3,76 ± 1,17
17	The problem is in accordance with the curriculum material previously worked on.	3,97 ± 0,97
18	The students are familiar with some of the knowledge needed to discuss the problem.	3,76 ± 1,17

Source: The authors.

To verify the reliability of the translated instrument, its internal consistency was also measured by means of Cronbach's alpha.

Reliability refers to how stable and consistent an instrument is. Internal consistency is a criterion for measuring such reliability. This refers to the homogeneity between the sub-parts of the instrument, i.e., whether they measure the same characteristics. Since the 1950s Cronbach's alpha has been the most widely used measure to test internal consistency. It

reflects the degree of variance between the items of the instrument (SOUZA, A.C; ALEZANDRE, N.M.C.; GUIRARDELLO, EB, 2017).

**Chart 2.** Cronbach's alpha of the Questionnaire to evaluate the quality of PBL problems - Brazilian version.

Factor	Cronbach's Alpha
Factor 1: Stimulates Thinking, Analysis and Reasoning	0,732
Factor 2: Stimulates Self-Directed Learning	0,742
Factor 3: Leads to Study of Intended Content	0,783
Factor 4: Enhances Interest in Subject	0,749
Factor 5: Relevance to Future Profession with Context	0,770
Realistic Context	0,810

Source: The authors.

The internal consistency indicators that measured the reliability of each factor. We noticed similar values among the component factors of the instrument. Factor 6 was the one that presented the greatest variation among its construct items. It is worth mentioning that its values do not refer to a characteristic of the scale itself but to the population studied (SOUZA, A.C; ALEZANDRE, N.M.C.; GUIRARDELLO, EB, 2017).

Although there is no consensus regarding its values and interpretations, some studies consider values higher than 0.7 to be ideal, with the maximum value being 0.9. Thus, the reliability test can be considered satisfactory (TERWEE, 2007).

In the original version of the instrument, reliability analysis was not used, only the measures of dispersion (standard deviation) and central tendency (mean) of each item. Therefore, it was not possible to compare the internal consistency of the two versions of the instrument.

## 4 Conclusion

The results found are favorable to the use of the instrument under study in the Brazilian version.

Its strong points are its compartmentalized structure in factors, allowing a contextualization of the theme to be addressed. As for the statements in each factor, the simplicity with which they were written in the original version, in a clear and concise manner, facilitated the adaptation process.

Since the origin of the PBL method was in foreign universities, such as MacMaster in Canada and Maastricht in Holland, many terms in English were already known, facilitating the translation process and relevant adjustments.

The cross-cultural adaptation process was carried out in a systematic way, following all the steps proposed in the literature, besides presenting a good reliability coefficient, thus being satisfactory. Thus, the Questionnaire to evaluate the quality of PBL problems is adapted to Brazilian Portuguese.

In conclusion, the "Questionnaire to evaluate the quality of cases/problems in PBA - Brazilian version" can be used as an instrument to evaluate problems in PBA.

It is recommended for further studies the deepening of psychometric analysis in order to carry out the process of construct validation.

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