

Semantic validation of educational technology with caregivers of children and adolescents undergoing chemotherapy

Validação semântica de tecnologia educacional com cuidadores de crianças e adolescentes em tratamento quimioterápico

Validación semántica de tecnología educacional con cuidadores de niños y adolescentes en tratamiento quimioterápico

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ABSTRACT

Objective: Semantically validate an educational technology with the caregiver of children and adolescents undergoing chemotherapy. **Method:** Methodological study, with a quantitative approach, guided by the theoretical framework of psychometry, developed between March and April 2022, with nine caregivers of children and adolescents undergoing chemotherapy. Educational technology is a digital animation film about the pediatric chemotherapy treatment process, used as a tool for health education. **Results:** In the reliability assessment, the Intraclass Correlation Coefficient was 0.936 [95%CI 0.868–0.984] with $p < 0.05$ and Cronbach's alpha of 0.943, demonstrating satisfactory internal consistency. Regarding the semantic analysis, the domains related to objectives, organization, language, appearance, and motivation showed an agreement rate above 80%. **Conclusion:** Educational technology showed satisfactory rates, proving to be a valid, reliable, and important instrument to be used by caregivers of children and adolescents undergoing chemotherapy.

Descriptors: Educational Technology; Caregiver; Neoplasms; Child; Adolescent.

RESUMO

Objetivo: Validar semanticamente uma tecnologia educacional com o cuidador da criança e adolescente em tratamento quimioterápico. **Método:** Estudo metodológico, de abordagem quantitativa, norteado pelo referencial teórico da psicometria, desenvolvido entre março e abril de 2022, com nove cuidadores de crianças e adolescentes em tratamento quimioterápico. A tecnologia educacional é um filme de animação digital sobre o processo de tratamento quimioterápico pediátrico, utilizada como ferramenta para educação em saúde. **Resultados:** Na avaliação da confiabilidade, o Coeficiente de Correlação Intraclassa foi de 0,936 [IC^{95%} 0,868–0,984] com $p < 0,05$ e alfa de Cronbach de 0,943, demonstrando uma consistência interna satisfatória. Em relação à análise semântica, os domínios relacionados aos objetivos, organização, linguagem, aparência e motivação apresentaram índice de concordância superior a 80%. **Conclusão:** A tecnologia educacional apresentou índices satisfatórios, demonstrando ser um instrumento válido, confiável e importante para ser utilizado pelos cuidadores de crianças e adolescentes em tratamento quimioterápico.

Descritores: Tecnologia Educacional; Cuidadores; Neoplasias; Criança; Adolescente.

RESUMEN

Objetivo: Validar semánticamente una tecnología educacional con el cuidador del niño y adolescente en tratamiento quimioterápico. **Método:** Estudio metodológico, abordaje cuantitativo, norteado por el referencial teórico de la psicometría, desarrollado entre marzo y abril de 2022, con nueve cuidadores de niños y adolescentes en tratamiento quimioterápico. La tecnología educacional es una película de animación digital sobre el proceso de tratamiento quimioterápico pediátrico, utilizada como herramienta para educación en salud. **Resultados:** En la evaluación de confiabilidad, el Coeficiente de Correlación Intraclassa fue 0,936 [IC^{95%} 0,868–0,984] con $p < 0,05$ y alfa de Cronbach de 0,943, demostrando una consistencia interna satisfactoria. En relación al análisis semántico, los dominios relacionados a objetivos, organización, lenguaje, apariencia y motivación presentaron índice de concordancia superior a 80%. **Conclusión:** La tecnología educacional presentó índices satisfactorios, demostrando ser un instrumento válido, confiable e importante para utilizarse por los cuidadores de niños y adolescentes en tratamiento quimioterápico.

Descriptorios: Tecnología Educacional; Cuidadores; Neoplasias; Niño; Adolescente.

INTRODUCTION

Educational technologies considered as tools that facilitate the teaching-learning process are being inserted in the practice of health education in several areas of professional activity, contributing to the improvement of the quality of care⁽¹⁾.

Thus, with the evolution of contemporary society, every day health professionals are faced with new technological resources that can be used for the benefit of the patient⁽²⁾. At this level, we highlight the insertion of educational technologies in the pediatric oncology scenario, which contribute to health education for children/adolescents and caregivers. In addition, they provide adherence to treatment and strengthen communication between professionals and patients⁽³⁾.

It is worth mentioning that childhood cancer affects children and adolescents between 0 and 19 years of age, who, due to their age, are in greater contact with the universe of technological devices. Therefore, professionals must think of ways to integrate innovations for the benefit of patients and their caregivers⁽⁴⁾.

It is important to consider that childhood cancer occurs in more than 300,000 children worldwide each year; and, in Brazil, for the period 2020-2022, it is estimated 8,460 new cases of cancer in children under 19 years of age. Another important fact is that the diagnosis involves great challenges, as there are no specific risk factors that can contribute to prevention; and because the signs and symptoms can be confused with other pathologies⁽⁵⁾.

From this perspective, the diagnosis appears suddenly, transforming the life not only of the child/adolescent, but of their caregiver, who is responsible for the decision-making regarding the treatment. Among the main types of therapeutic approach is chemotherapy, which can be performed alone or associated with radiotherapy and surgery. It is noteworthy that chemotherapy treatment is still marked by stigmas related mainly to side effects, and it is necessary to inform about the practice of self-care and measures to minimize these effects⁽⁶⁾.

In this context, the caregiver's first contact with pediatric oncology, most of the time, is marked by fear and insecurities regarding the diagnosis and treatment, which can make it difficult to understand the child's oncological process⁽⁷⁻⁸⁾.

Furthermore, it is necessary to take into account that the caregiver may not have enough training to understand technical terms, and it is necessary to facilitate communication using a language accessible to all, which is enlightening, simple and objective⁽⁹⁾. Thus, for the effectiveness of the treatment, the performance of the multi-professional team is essential, especially the nurse, who plays an important role in the health education process, welcoming doubts and building strategies that allow the understanding of the family and patient⁽¹⁰⁾.

In this light, health education in pediatric oncology is constituted as a continuous process that provides caregivers and children/adolescents with a closer relationship with the team. Educational technologies, such as booklets, manuals, videos, can contribute to strengthening the knowledge of the child/adolescent and caregiver, in addition to being accessible when there is any doubt, assisting in decision making⁽¹¹⁻¹²⁾.

However, for the technology to be effective, it must meet the needs of the target audience; for this, the validation of the

instrument is essential to the reliability of the technology. It is worth mentioning that the construction and validation of a technology involve several stages of development and testing that allow the adequacy of the instrument⁽¹³⁾.

Among the steps, there is the semantic validation with the target audience, which is fundamental for reformulations of language, images, sound and writing, enabling an easy-to-understand material for the reality of each audience⁽¹⁴⁻¹⁵⁾. Semantic validation aims to assess whether the items of an instrument are understandable to the audience for which the technology is intended, taking into account the lowest stratum (educational level) of the population⁽¹⁶⁾.

Therefore, considering the importance of validation with the target audience, the study is justified due to the need to use an educational technology for caregivers of children and adolescents with cancer that can be reliable and effective, with an emphasis on validation using suitable methodological references.

OBJECTIVE

Semantically validate an educational technology with the caregiver of children and adolescents undergoing chemotherapy.

METHODS

Ethical aspects

The study followed the recommendations of Resolution 466/12 of the National Health Council, referring to research related to human beings, being evaluated, and approved by the Ethics and Research Committee of the Federal University of Rio Grande do Norte (UFRN). To guarantee the autonomy and right of refusal of the participants, the Free and Informed Consent Form was used, containing information about the nature, duration, methodology, risks, and benefits of the study, being signed by the main researcher and caregiver of the child and adolescent undergoing treatment. chemotherapy. The right to withdraw from the research at any time was explained. In addition, confidentiality and anonymity of the data were guaranteed.

Study design, period, and location

This is a methodological study, with a quantitative approach, guided by the theoretical framework of psychometry⁽¹⁶⁾. It was developed as a pilot study of a larger project entitled "Multimedia strategy for acquiring knowledge and reducing anxiety in caregivers of children and adolescents undergoing chemotherapy: a randomized clinical trial". This uses an educational technology to assess the effectiveness in terms of acquiring knowledge and reducing anxiety in caregivers of children and adolescents newly diagnosed with cancer and who will be treated with chemotherapy.

It is noteworthy that the pilot study has been developed by the researchers before the study itself, contributing to the strengthening of methodological strategies and validation of the research instrument⁽¹⁷⁾.

It was developed between March and April 2022, in a philanthropic hospital that is a reference in the treatment of childhood

cancer in the state of Rio Grande do Norte (RN), located in the capital, Natal.

Population, inclusion, and exclusion criteria

The study sample was non-probabilistic, considering Pasquali's (2010) framework, which recommends a minimum of six participants in the semantic validation process with the target audience. In addition, they must have different levels of education (elementary, secondary and higher)⁽¹⁶⁾. Thus, the sample consisted of the first nine caregivers of children and adolescents recently diagnosed with cancer and in the beginning of chemotherapy treatment, with group 1 having three primary level caregivers; group 2, four mid-level caregivers; and group 3, two higher education caregivers. They were recruited upon admission of the child/adolescent to the oncology sector to start chemotherapy during the months of March and April 2022.

As inclusion criteria, the following were adopted: being 18 years of age or older and being the main caregiver of the child/adolescent who will start the chemotherapy treatment. Participants who presented the following conditions were excluded from the study: disorder that prevents understanding and participation in the research; caregivers of children and adolescents who are starting chemotherapy treatment with disease recurrence; caregivers who have already had experience in caring for patients undergoing chemotherapy, people with visual or hearing deficits.

It is noteworthy that, in most studies, the semantic validation process has been developed as a pilot test in the population to be analyzed, with a small sample of people⁽¹⁸⁾.

Study protocol

The methodological study is part of the first stage of development of a larger project, which uses as educational technology a digital animation film about the pediatric chemotherapy treatment process. This resource was developed by Pinheiro et al. (2020)⁽¹⁹⁾, was validated by experts in the field and authorized to carry out the study. However, the need to run the pilot test was seen to perform the semantic analysis of the film, validating it with the target audience, for later use in a randomized clinical trial.

The digital animation film was developed to act as a strategic instrument for health education in the context of pediatric oncology, addressing the pediatric chemotherapy treatment process. The film highlights the importance of cancer therapy in children and adolescents, demonstrating what chemotherapy is and the care needed during treatment. The film lasts 12 minutes and 22 seconds.

To evaluate the digital animation film, a questionnaire adapted from the study by Oliveira (2006)⁽²⁰⁾ was used, which, in the first part, addresses the identification data of the participants. The second part of the questionnaire assesses the objectives, organization, language, appearance and motivation of the technology, adapted from the Suitability Assessment of Materials (SAM)⁽²¹⁾. Questionnaire items are evaluated on a Likert-type scale: 4 = Totally Adequate (TA); 3 = Adequate (A); 2 = Partially Adequate (PA); and 1 = Inadequate (I).

Analysis of results

Regarding the statistical analysis, the semantic agreement index (SAI) was considered, which indicates the proportion of participants in agreement on a certain aspect of the instrument. An SAI of at least 70% (0.70) is recommended. The data obtained were organized, processed, and analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.0.

To assess the reliability of the digital animation film assessment instrument, the Intraclass Correlation Coefficient (ICC)⁽²²⁾ and Cronbach's alpha⁽²³⁾ were calculated to verify internal consistency. The values considered in the study are shown in Table 1.

Table 1 – Intraclass Correlation Coefficient and Cronbach's alpha values, Natal, Rio Grande do Norte, Brazil, 2022

Valores	ICC*	Values	Cronbach's alpha
0.75 to 1.0	Excellent	0.81 to 1.0	Almost perfect reliability
0.6 to 0.75	Good	0.61 to 0.80	Substantial
0.4 to 0.6	Reasonable	0.41 to 0.60	Moderate
< 0.4 Poor	Poor	0.21 to 0.40 0 to 0.21	Reasonable Small

Note: * ICC – Intraclass Correlation Coefficient.

RESULTS

Regarding sociodemographic data (Table 2), there was a predominance of female caregivers (88.9%), mean age of 31.2 years (SD = 8.33), 55.5% were married, and 44.4% had a family income between one and two minimum wages.

Table 2 – Characterization of the target population participating in the digital animation film validation process, Natal, Rio Grande do Norte, Brazil, 2022

Variables	nº	%	Minimum-Maximum	Mean+SD*
Sex				
Female	8	88.9		
Male	1	11.1		
Age group				
> 20 to < 30 years	5	55.5		
> 30 to < 40 years	2	22.2	20-42	31.2 anos + 8.33
> 40 years	2	22.2		
Educational level				
Lower	3	33.3		
Highschool	4	44.4		
Higher education	2	22.2		
Civil status				
Single	4	44.4		
Married	5	55.5		
Family income				
< 1 MW †	2	22.2		
1 to 2 MW	4	44.4		
> 2 to 3 MW	1	11.1		
> 3 MW	2	22.2		

Note: * SD: standard deviation; †MW: minimum wages (R\$ 1.212 reais).

In the semantic analysis by the target audience, the domains related to objectives, organization, language, appearance, and motivation obtained a positive evaluation, reaching a minimum agreement above 80% (Table 1). The responses of the target audience, for the most part, were included in the TA and A alternatives with 158 (97.5%) of the responses, while 4 (2.46%) considered the PA option, and no item was considered inappropriate.

Chart 1 – Assessment of the target audience regarding the objectives, organization, language, appearance, and motivation of the digital animation film, Natal, Rio Grande do Norte, Brazil, 2022

	Positive answer (TA)* (A)†		Impartial answers (PA)‡		Negative answers (I)§		SAI**	SAI domain
	n	%	n	%	n	%		
1. OBJECTIVES							1.00	1.00
Q1 - Meets the objectives.	9	100	-	-	-	-	1.00	
Q2 - Help with everyday life.	9	100	-	-	-	-	1.00	
Q3 - Provides knowledge about childhood cancer and chemotherapy treatment.	9	100	-	-	-	-		
2. ORGANIZATION								0.97
Q4 - The beginning of the film is attractive.	8	88.8	1	11.1	-	-	0.88	
Q5 - The number of scenes is adequate.	9	100	-	-	-	-	1.00	
Q6 - Topics are in sequence.	9	100	-	-	-	-	1.00	
Q7 - The material makes it difficult to see somewhere.	9	100	-	-	-	-	1.00	
3. LANGUAGE								0.96
Q8 - Vocabulary is accessible.	8	88.8	1	11.1	-	-	0.88	
Q9 - The movie quotes are explanatory.	9	100	-	-	-	-	1.00	
Q10 - The sound is adequate.	9	100	-	-	-	-	1.00	
4. APPEARENCE								0.97
Q11 - The images are simple and attractive.	9	100	-	-	-	-	1.00	
Q12 - The film portrays orienteering adequately.	9	100	-	-	-	-	1.00	
Q13 - The scenes in the movie are closer to reality.	8	88.8	1	11.1	-	-	0.88	
Q14 - Scenes look organized and follow a logic.	9	100	-	-	-	-	1.00	
Q15 - The film is simple and attractive.	9	100	-	-	-	-	1.00	
5. MOTIVATION								0.96
Q16 - In his opinion, any participant who watches the film will understand what it is all about.	9	100	-	-	-	-	1.00	
Q17 - Did you feel motivated to watch until the end?	8	88.8	1	11.1	-	-	0.88	
Q18 - The use of film becomes important.	9	100	-	-	-	-	1.00	
Total	158	-	4	-	-	-	0.97	0.97

Note: * TA: Totally adequate; † A: adequate; ‡ PA: partially adequate; § I: inappropriate; ** SAI: Semantic Agreement Index.

Table 3 – Analysis of the reliability and internal consistency of the domains analyzed in the Semantic Validation Instrument of the digital animation film, Natal, Rio Grande do Norte, Brazil, 2022

Domains	ICC*	CI _{95%} **	Cronbach's alpha	p value
Objectives	0.871	[0.317-0.912]	0.857	0.001
Organization	0.597	[-0.165 – 0.900]	0.617	0.048
Language	0.623	[0.023 – 0.899]	0.767	0.006
Appearance	0.879	[0.680 – 0.969]	0.869	0.000
Motivation	0.833	[0.508 – 0.958]	0.857	0.001

Note: * ICC: Intraclass Correlation Coefficient; ** CI: confidence interval.

In assessing the reliability of the digital animation film assessment instrument, a satisfactory total internal consistency was observed, with a Cronbach's alpha of 0.943 and a total ICC of 0.936 [95%CI 0.868 – 0.984] and a significant p value (p < 0, 05). However, analyzing the domains individually, it is observed that the organization domain presented a Cronbach's alpha of 0.617 and an ICC of 0.597, indicating adjustments to increase the reliability of the domain (Table 3).

In Table 4, it is possible to observe the reliability analysis for the caregivers' answers on the digital animation film evaluation questions, using Cronbach's alpha.

Table 4 – Cronbach's alpha results if the item is removed from the digital animation film assessment instrument, Natal, Rio Grande do Norte, Brazil, 2022

Evaluated question	Cronbach's alpha if the item is excluded
Q1-Q2-Q3	0.931
Q4-Q6	0.939
Q5- Q7-Q18	0.933
Q8	0.929
Q9- Q12- Q14-Q15-Q16	0.928
Q10	0.946
Q11	0.937
Q13	0.932
Q17	0.927
Instrument Cronbach's Alpha	0.943

DISCUSSION

Through the results, it is evident the adequacy of the educational technology in relation to the target audience, presenting a semantic agreement index superior to 80%; therefore, it can be used in future research related to health education in pediatric oncology.

In this context, educational technologies, when validated with the target audience, are important strategies for the health education process, as they consider the peculiarities of each group, as well as the age group and level of education. For the validation process, it is important that the participating public is of different levels of education to verify the accessibility of the technology⁽¹⁶⁾.

In this way, the study covered the three levels of instruction — elementary, high school and higher education — demonstrating the suitability of technology for all of them. It is noteworthy that the clear and easy-to-understand language contributes to the increase in knowledge and greater engagement of the public for which the technology is intended⁽²⁴⁾.

Furthermore, the language of educational technology must be welcoming, simple, objective and dialogic, facilitating the acquisition of knowledge and bringing the target audience closer to the intended objectives⁽²⁵⁾.

Regarding the domains evaluated, the analysis in other research stands out in which the adequacy of educational technology was achieved through objectives, clarity, language and motivation⁽¹⁵⁾. In the present study, the domain related to the objectives presented the highest agreement rate, demonstrating that the technology is visualized in a simple, understandable way, and achieves its purpose.

Furthermore, educational technologies need to be evaluated by indicators that allow greater reliability and credibility⁽²⁶⁾. Thus, it is noteworthy that the Cronbach's alpha test for the analysis of the instrument's internal consistency showed a significant result (0.943), being one of the most important statistical tools for validation⁽²⁷⁾.

It is noteworthy that the public participating in the research was predominantly female, which can be linked both to the historical process of the figure of the woman in caring and to her role as a mother. In pediatric oncology, the mother as being solely responsible for the child/adolescent is a frequent reality; and the dedication revealed by the caring mother causes impacts related to overload and exhaustion. In this way, there needs to be an integration with the family of the child/adolescent with cancer so that the challenges and responsibilities are shared and the oncological process can be faced more lightly⁽²⁸⁾.

It is known that illness and hospitalization change the family's daily life, causing the caregiver to perform multiple tasks and difficulties related to financial resources: many are forced to stop working or adapt their functions to reconcile with the routine of hospitalizations required by the caregiver. chemotherapy treatment⁽²⁹⁾.

This data converges with what was found in the present study, in which it was observed that most participants have a family income of one to two minimum wages. The financial aspect is one of the caregiver's concerns and influences their general condition, because, by spending a lot of time in the hospital, they end up giving up their work or changing schedules to reconcile with the new routine⁽³⁰⁾.

Associated with these changes are the countless information provided to caregivers during the diagnosis and treatment of the

child/adolescent with cancer, which can interfere with the caregiver's emotional state, generating anguish and fears, especially if shared with difficult language, making understanding difficult⁽²⁸⁾.

In this way, the public that takes care of children and adolescents with cancer needs the reception of professionals, especially nurses who are in direct contact with the first care during the childhood cancer treatment phase. Thus, the construction of educational technologies, such as videos, applications and films, contributes to the transfer of information in a playful way, bringing the caregiver closer to pediatric oncology^(19,28).

It is noteworthy that the mediation of communication through animations offers a multisensory and multidimensional support that can meet the needs of different audiences, including the most needy populations, providing greater integration and participation of patients and families⁽³¹⁾.

Thus, the educational technology validated in the study - digital animation film - is inserted as a multimedia resource that transmits information using animations with characters, scenarios, and audio about the chemotherapy treatment process, providing an interactive environment with the public.

It should be noted that health education with the use of multimedia is effective especially when performed before therapeutic procedures, as in the case of chemotherapy administration. Prior knowledge about care during chemotherapy, such as food, hygiene, prevention of risks related to infection, makes the caregiver feel more prepared for the management of children and adolescents throughout this period⁽³²⁾.

Therefore, taking into account that educational technologies are important to expand access to information by different social groups, it is understood that the validation process is essential for the local context (as in hospitals) and, in this case, for pediatric oncology⁽³³⁾. Validation studies with the target audience contribute to the refinement of instruments, because, through suggestions, it is possible to make approximations with the reality of each audience. In addition, the validation process allows the dissemination of safe and reliable information⁽³⁴⁾.

Study limitations

One of the limitations of the study was the fact that the semantic validation with caregivers was performed in a single hospital. Another possibility refers to the reduced number of publications with educational technologies validated for the caregiver of children/adolescents with cancer.

Contributions to the field of Nursing, Public Health, or Public Policy

The present work contributes to the strengthening of health education practices, highlighting the importance of the validation process for the effective use of an educational technology, which can be used in future research by reference centers in pediatric oncology.

CONCLUSION

The educational technology of the present study proved to be a valid and important instrument to be used by caregivers of

children and adolescents undergoing chemotherapy, showing an agreement rate higher than recommended.

The study highlights the need for professionals to use validated educational technologies that can contribute to the acquisition of knowledge and strengthen the adherence of patients and caregivers to cancer treatment. It is noteworthy that the well-informed caregiver can safely dialogue with the child/adolescent and get closer to the team of professionals working in oncology.

The area of pediatric oncology is complex in that it deals with the treatment of children/adolescents in a long-term pathological process, and this results in the need for educational resources that can facilitate the process of communication and guidance in a humanized way.

Therefore, validation with the target audience carried out in this study is essential to ensure the reliability of the educational technology and can be used by professionals as a source of guidance in the first contact with caregivers of children/adolescents with cancer.

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