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RESEARCH

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Development and theoretical validity of the *PedCresce* game on nursing consultation with children

Desenvolvimento e validação teórica do jogo PedCresce sobre consulta de enfermagem à criança

Desarrollo y validación teórica del juego PedCresce en consulta de enfermería infantil

Bruna Gonçalves Gratão[1]
George Oliveira Silva[1]
Natália Del' Angelo Aredes[1]

1. Universidade Federal de Goiás, Faculdade de Enfermagem. Goiânia, GO, Brasil.

ABSTRACT

Objective: to develop and validate the *PedCresce* game content and appearance about nursing consultation with children in the context of Primary Health Care. **Method:** a descriptive and exploratory study to validate a board game with child health experts, conducted between 2022 and 2023. The Cardinot, McCauley and Fairfield guide for developing board games, developed to support educators, was adopted as a methodological framework. Content validity was verified by the Content Validity Index, and agreement was verified by the Modified Kappa Coefficient, with values >0.8 being considered validated. **Results:** of the 60 challenges that make up the game cards, 51 obtained satisfactory content validity indices and excellent inter-rater agreement, with nine being mandatorily revised according to experts' suggestions. The assessment of pedagogical aspects and appearance of the game obtained excellent agreement. **Conclusion and implications for practice:** the *PedCresce* board game with 60 challenges was developed based on scientific literature and validated by experts, reaching more than 0.8 in the Content Validity Index and Kappa coefficient. The *PedCresce* game validity ensures the pedagogical relevance and quality of the information contained in the educational game, being a tool to support teaching and learning.

Keywords: Nursing; Nursing Students; Gamification; Child Health; Educational Technology.

RESUMO

Objetivo: desenvolver e validar o conteúdo e a aparência do jogo PedCresce sobre consulta de enfermagem à criança no contexto da Atenção Primária à Saúde. **Método:** estudo descritivo e exploratório para validação de um jogo de tabuleiro com *experts* em saúde da criança, conduzido entre 2022 e 2023. Adotou-se como referencial metodológico o guia de Cardinot, McCauley e Fairfield para elaboração de jogos de tabuleiros, desenvolvido para apoiar educadores. A validade de conteúdo foi verificada pelo Índice de Validade de Conteúdo, e a concordância, verificada pelo Coeficiente de Kappa Modificado, sendo considerados validados valores >0,8. **Resultados:** dos 60 desafios, que constituem as cartas do jogo, 51 obtiveram índices satisfatórios de validade de conteúdo e excelente concordância entre avaliadores, sendo que nove foram obrigatoriamente revisados segundo as sugestões dos *experts*. A avaliação dos aspectos pedagógicos e aparência do jogo obtiveram excelente concordância. **Conclusão e implicações para a prática:** o jogo de tabuleiro PedCresce, com 60 desafios, foi desenvolvido a partir de literatura científica e validado por *experts*, atingindo mais que 0,8 no Índice de Validade de Conteúdo e coeficiente Kappa. A validação do jogo PedCresce assegura a relevância pedagógica e qualidade das informações contidas no jogo educativo, sendo uma ferramenta de apoio ao ensino-aprendizagem.

Palavras-chave: Enfermagem; Estudantes de Enfermagem; Gamificação; Saúde da Criança; Tecnologia Educacional.

RESUMEN

Objetivo: desarrollar y validar el contenido y la apariencia del juego *PedCresce* sobre consultas de enfermería para niños en el contexto de la Atención Primaria de Salud. **Método:** estudio descriptivo y exploratorio para validar un juego de mesa con expertos en salud infantil, realizado entre 2022 y 2023. Se adoptó como referencia metodológica la guía de Cardinot, McCauley y Fairfield para la creación de juegos de mesa, desarrollada para apoyar a los educadores. La validez de contenido se verificó mediante el Índice de Validez de Contenido, y la concordancia se verificó mediante el Coeficiente Kappa Modificado, considerándose validados los valores >0,8. **Resultados:** de los 60 desafíos que componen las fichas del juego, 51 obtuvieron índices de validez de contenido satisfactorios y excelente concordancia entre evaluadores, siendo nueve revisados obligatoriamente según las sugerencias de los expertos. La evaluación de los aspectos pedagógicos y apariencia del juego obtuvo excelente acuerdo. **Conclusión e implicaciones para la práctica:** el juego *PedCresce* con 60 desafíos fue desarrollado con base en literatura científica y validado por expertos, alcanzando más de 0,8 en el Índice de Validez de Contenido y coeficiente Kappa. La validación del juego *PedCresce* asegura la pertinencia pedagógica y la calidad de la información contenida en el juego educativo, siendo una herramienta de apoyo a la enseñanza y al aprendizaje.

Palabras clave: Enfermería; Estudiantes de Enfermería; Gamificación; Salud Infantil; Tecnología Educativa.

Corresponding author:
Natália Del' Angelo Aredes.
E-mail: naredes@ufg.br

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INTRODUCTION

Assistance to children in the context of Primary Health Care (PHC) in the Brazilian Health System (In Portuguese, *Sistema Único de Saúde* - SUS) involves actions to promote health, prevent diseases and continuous monitoring, which aim to reduce risks and ensure healthy growth and development.[1] The main activities include monitoring growth and development, vaccination, monitoring nutritional status and providing health guidance to families. By creating bonds between healthcare professionals and families, the assistance provided facilitates the early identification of health problems and the implementation of preventive interventions.[1] Considering the recent impact of the COVID-19 pandemic on monitoring children's development in PHC,[2] actions are needed to strengthen this practice during future nurses' training period.

In this regard, undergraduate nursing training increasingly demands the use of strategies that stimulate critical thinking and the development of essential skills for comprehensive child healthcare.[3] The use of tools such as educational games can deepen students' understanding of topics such as monitoring child growth and development, allowing the application of theoretical knowledge in a safe and controlled environment.[4] This type of approach can help future nurses face the challenges of clinical practice and increase engagement with studies and safety, promoting more complete training that is closer to the reality of SUS.[5]

The basis for using games in education is well established in literature,[6] and their potential for strengthening the teaching-learning process is described, highlighting the dynamic and integrative nature of theory with practice, being safe for learning leadership, teamwork and communication, being motivating and triggering the cognitive process for the interpretation of clinical conditions and facilitating the understanding of content.[7,8]

Educational games are defined as tools for engaging players around a challenge, whose interaction is defined by rules, permeated by interactivity and feedback.[9] Its use, as well as gamification in general, is described in many different contexts, varying the age of the target population and training objectives, having initially been more common in early childhood education and then expanded to other levels of education, coming to be used in universities, in continuing education in health and also with health system users, from the perspective of health education.[10-12]

Although games differ from gamification because they have all the formal elements (levels, scores, characters, hints, multimedia resources and time limits for solving tasks), gamification uses the game's engagement structure in a certain activity, without there being a game itself.[13,14] Therefore, it is understood that literature on both concepts is strictly related and that every game has gamification, but not every gamification has a game.

In the context of continuing health education and initial training of future nurses, gamification and games can be valuable strategies for developing clinical skills necessary for healthcare.[15] From engagement in learning, through the potential for knowledge acquisition and learning retention, to the development of technical skills, such as medication administration or post-operative rehabilitation in children, games and gamification in general have made important contributions to higher education, contributing to the use of innovative and interactive teaching strategies.[15-19]

Considering the need for innovations in the field of teaching with entertainment and tools that adhere to scientific literature to support learning in health, *PedCresce* was developed as a technological product with a focus on child healthcare. It can contribute to strengthening comprehensive child healthcare in SUS, as it has the potential to be incorporated into the training process of students and nurses. Thus, this study aimed to develop and validate the content and appearance of *PedCresce* on nursing consultation with children in the context of PHC.

METHOD

This descriptive and exploratory study was developed to describe the validity process by experts of *PedCresce* on nursing consultations with children in the context of PHC. Validity is an extremely important phase to promote rigor and indicates the degree to which a product is suitable for use in its intended purpose, through an instrument completed by experts on the subject, representing how much the criteria that validate it are close to or far from the developed product.[20] To develop *PedCresce*, the phases of developing board games were adopted according to the methodological framework proposed by the Cardinot, McCauley and Fairfield guide (empathise, define, ideate, prototype, playtest).[21]

The selection of participants for the study was based on criteria defined by Fehring, adapted to score experts based on their academic background, publications, practice and participation in scientific events in the area of interest.[22] As a criterion for inclusion in the study, a minimum score of five points was established according to Fehring criteria, and exclusion was determined by the impossibility of correctly completing the data collection instruments. Sampling was non-probabilistic for convenience, depending on the availability of experts to participate in the research so that a minimum sample of six experts was established for validity.[23] Participants were identified via the *Lattes* Platform by searching for terms related to child health and recruited via email. The resulting expert panel was used to validate the content and assess the game's pedagogical aspect. After completing the survey form, experts were invited to suggest other experts for participation in the study using the snowball technique.

The study was conducted in two stages between April 2022 and May 2023, namely: 1. Development of board game with cards containing the challenges and answers based on updated scientific literature; and 2. Content validity contemplating the board's pedagogical aspects and appearance by experts in child health and with experience in developing health games.

In the first stage, related to game development, the Cardinot, McCauley and Fairfield framework was adopted, divided into five phases: a) Empathise, in which the game's time logistics, target audience, prior knowledge requirements for participation, assessment of knowledge or skills developed during the game and users' previous experience playing non-computer games

are defined; b) Define, in which the game's expected learning outcomes, mechanics and rules and challenges are defined; c) Ideate, in which the material components that will be necessary for the physical version of the game, the rules and instructions that players must follow, and the topic or story that will immerse players are defined; d) Prototype, in which a prototype is developed and the game's gameplay is tested; e) Playtest, which involves player assessment and feedback. This study describes the first four phases of game development, proposing the fifth phase as a future study.[21]

After the development stage, a game prototype with cards and a board was created, which was submitted for assessment by experts to validate the content, assess the game's pedagogical aspects and appearance.

The data collection instrument was developed by the authors and structured in Google Forms, divided into two sections, namely: 1. Card content assessment, in which the main purpose was to verify with experts in child health whether the game content is relevant, compatible with scientific literature in the area, whether it presents the content clearly and whether it contributes to learning on the topic, with the content of each card being judged according to alternatives 1 (not relevant), 2 (needs major adjustments), 3 (needs minor adjustments) and 4 (relevant), in addition to space for suggestions; and 2. Assessment of pedagogical aspects and appearance of the game, containing general questions about the game's contribution to nursing education (13 items), use of colors and illustrations in the game (2 items).

Game cards were divided among experts so that each set of 20 cards was validated by at least six experts, the minimum recommended for content validity.[20] This mechanism was intended to avoid overloading experts, and at the same time, each expert was given the opportunity to respond to more than one series of challenges, if they wished. Thus, 40 experts were invited, considering potential refusals to participate and the data collection period, which took place from June to August 2022.

Experts' responses were exported to a Microsoft Office Excel spreadsheet and then analyzed using R version 4.3.1 (R Core Team, Vienna, Austria). To verify the validity of game card content and to assess pedagogical aspects, the Content Validity Index (CVI) was used. This index assesses the representativeness of each item on a 4-point Likert scale, where: 1 - not relevant; 2 - needs major adjustments; 3 - needs minor adjustments; and 4 - relevant. The score was obtained by adding the agreement of items marked with scores "3" or "4" by experts, divided by the total responses, and multiplying by 100 (CVI = agreement with score "3" or "4"/total responses x 100). Items that received scores "1" or "2" were mandatorily revised. Values equal to or greater than 80% were considered acceptable for instrument validity.[20]

To verify agreement between experts, the modified Kappa coefficient was used.[23,24] To calculate the modified Kappa coefficient, first, the probability of agreement for each item was calculated using the formula:

$$P_C = \left[N! \ / A! \ (N - A)!\right]^* \ . \ 5^N$$

Thus, N = number of experts, A = number of experts who agree that the item is relevant. Kappa calculation was performed based on the probability of chance of agreement and the CVI of each item, using the formula:

$$Kappa = \left(CVI - P_C\right) \ / \ \left(1 - P_C\right)$$

As a reference for the cut-off point, we adopted: Kappa between 0.40 and 0.59, as poor agreement; Kappa between 0.60 and 0.74, as good agreement; and Kappa above 0.75, as excellent agreement.[24]

The research project was approved by the Research Ethics Committee of the *Hospital das Clínicas* of *Universidade Federal de Goiás* in 2022 (Opinion 5.208.367), and all stages of the study respected the recommendations of Resolution 466/2012 of the Brazilian National Health Council, which included the provision of the and Informed Consent Form to participants.

RESULTS

PedCresce development

To develop *PedCresce*, the content of 60 cards was initially prepared in four different types of questions. The main topic is the monitoring of child growth and development in PHC, and challenges were prepared based on updated documents in scientific literature and Brazilian health agencies, such as: Brazilian National Policy for Comprehensive Child Healthcare (In Portuguese, *Política Nacional de Atenção Integral à Saúde da Criança* - PNAISC); Child Health Handbook (In Portuguese, *Caderneta de Saúde da Criança*); Integrated Care Manual for Prevalent Childhood Illnesses (AIDPI) Children: 2 months to 5 years (In Portuguese, *Manual de Atenção Integrada às Doenças Prevalentes na Infância (AIDPI) Criança: 2 meses a 5 anos*); Food guide for Brazilian children under 2 years (In Portuguese, *Guia alimentar para crianças brasileiras menores de 2 anos*); and Brazilian National Iron Supplementation Program - General Procedures Manual (In Portuguese, *Programa Nacional de Suplementação de Ferro - Manual de Condutas Gerais*).[25-29]

The content of *PedCresce* cards was developed by adapting technical and scientific content on child health into clear and accessible language, appropriate to the educational context. The process involved translating official guidelines and recommendations into practical and contextualized questions to reinforce students' knowledge about child monitoring in PHC, following the following stages: 1. Identification of the most relevant content for inclusion in the cards; 2. Preparation of questions; and 3. Adaptation of the question to the established type of card. After constructing card content, the game mechanics were developed, which are described in Chart 1.

Content validity and assessment of pedagogical aspects and appearance of the game

Among the 40 experts invited, 12 agreed to participate in the research and three of them assessed the three series of questions. All challenges were assessed by at least six experts.

Chart 1. Development process of the *PedCresce* game mechanics. Goiânia, GO, Brazil, 2023.

I. EMPATHISE
Description
The *PedCresce* board game is an educational game with competitive gameplay between players, surprise cards that strengthen the interaction and entertainment aspect, and challenges based on scientific literature in the area. It was initially designed for nursing students, but it has the potential to also support nurses already working in the world of work. The objective is to provide teaching and learning about child health in a playful way, emphasizing the essential care needed to support the monitoring of child growth and development within PHC. During the game, players are confronted with typical clinical situations that involve the context of nursing consultation in this scenario and require critical thinking for decision-making, manifested by the response to each challenge on the game cards (topics in Table 1).
Game duration
30 minutes to 1 hour and 30 minutes.
Target audience
Undergraduate nursing students and nurses.
Required prior knowledge
Nursing consultation in the context of PHC, physical examination of children, and monitoring of child growth and development.
Assessment of knowledge developed
Verified by correct answers and progress on the board, although learning is greater than what the correct answers represent, since, when making a mistake, feedback is read with the correct answer and reference, which can be consulted in full.
Previous experience playing non-computer games
It is not necessary.
II. DEFINE
Expected results
Support the development of knowledge related to children's health. It is believed that interaction between peers (players) and feedback based on scientific literature can promote potentially significant learning experiences.
Game mechanics and rules
Objective: accumulate points and reach the end of the board.
Player actions: movement on the board occurs according to the number of correct answers. The opposing player on the left must read the content of the card to the challenged player and, if correct, the player moves on the board.
Types of cards: there are two types of cards: orange cards, which are navigation cards to boost gameplay, containing statements such as "advance one space", "return two spaces", "answer a question instead of the player in turn"; and purple, green and blue cards, with challenges in different formats, such as multiple choice, true or false and which require an answer without alternative, but offering hints.
Elements of luck: orange navigation cards that are activated as the participant reaches a space with the design of an envelope.
III. IDEATE
Material components
• 1 board
• 60 challenge cards
• 25 envelopes
• 4 pins
Note: the timer can be set by the players themselves on their smartphones.
Instructions
All players place their respective pins at START. Navigation around the board is dictated by the hits and misses of the challenges (cards with different colors).
• Green and purple cards - advance two spaces if they get it right and stay in the space if they do not answer or get it wrong.
• Blue and orange cards - move forward one space if correct and move back one space if incorrect. In each round, the player takes a card from the pile and, without seeing its contents, passes it to the player on their left who will read it. The player whose turn it is tries to answer and, after one attempt to answer or the timer runs out (30 seconds or 1 minute), the player who read the question confirms the correct answer (contained on the card itself).
On the board, spaces with the envelope icon allow the player to pick up an envelope from the pile and read aloud various instructions (e.g., move back one space, choose a player to move back one space, move forward one space). As long as there are envelopes in the pile, they must be read. Each card read or envelope used must be discarded and not returned to the pile.
They can play in pairs or in trios. Make two teams of pairs or trios, and the team members can discuss the possible answers, reporting them at the end when they are sure. The winner is the player who reaches the last square on the board.
Game topic
Child health – nursing consultation and monitoring of child growth and development in PHC.
IV. PROTOTYPE
Game prototype
The game prototype, including the board and cards, was created using Canva®, a free graphic design platform.

Table 1. Content validity and inter-rater agreement by game question. Goiânia, GO, Brazil, 2023.

ID	Question type	Question topic	Agreements	Disagreements	CVI	Kappa	Assessment
P01	Questions with hints	Vaccination	6	0	1.00	1.00	Excellent
P02		Vitamin A supplementation	3	3	0.50	0.27	No agreement
P03		Neonatal screening	5	1	0.83	0.82	Excellent
P04		Physical examination of newborns	3	3	0.50	0.27	No agreement
P05		Introduction to food	5	1	0.83	0.82	Excellent
P06		Vaccination	5	1	0.83	0.82	Excellent
P07		Introduction to food	5	1	0.83	0.82	Excellent
P08	Questions without hints and 1 minute answer time	Vaccination	4	2	0.67	0.56	Poor
P09		Vaccination	6	0	1.00	1.00	Excellent
P10		Development	4	2	0.67	0.56	Poor
P11		Development	3	3	0.50	0.27	No agreement
P12		Vitamin A supplementation	6	0	1.00	1.00	Excellent
P13		Ferrous sulfate supplementation	5	1	0.83	0.82	Excellent
P14		Physiological jaundice	5	1	0.83	0.82	Excellent
P15		Introduction to food	3	3	0.50	0.27	No agreement
P16		Introduction to food	5	1	0.83	0.82	Excellent
P17		Growth	5	1	0.83	0.82	Excellent
P18		AIDPI	4	2	0.67	0.56	Poor
P19		AIDPI	3	3	0.50	0.27	No agreement
P20		GD consultation	6	0	1.00	1.00	Excellent
P21	Questions without hints and 30 second answer time	BP assessment in children	6	0	1.00	1.00	Excellent
P22		Vaccination	6	0	1.00	1.00	Excellent
P23		Neonatal screening	6	0	1.00	1.00	Excellent
P24		Growth	6	0	1.00	1.00	Excellent
P25		Development	6	0	1.00	1.00	Excellent
P26		Vaccination	5	1	0.83	0.82	Excellent
P27		Growth	6	0	1.00	1.00	Excellent
P28		Expression and storage of breast milk	6	0	1.00	1.00	Excellent
P29		Vaccination	5	1	0.83	0.82	Excellent
P30		Neonatal screening	5	1	0.83	0.82	Excellent
P31		Vitamin A supplementation	6	0	1.00	1.00	Excellent
P32		Vitamin A supplementation	6	0	1.00	1.00	Excellent
P33		Clinical assessment of children	6	0	1.00	1.00	Excellent
P34		Vaccination	6	0	1.00	1.00	Excellent
P35		Vaccination	6	0	1.00	1.00	Excellent
P36		Vital signs of children	6	0	1.00	1.00	Excellent
P37		Growth	6	0	1.00	1.00	Excellent
P38		Development	6	0	1.00	1.00	Excellent
P39	Multiple Choice Questions	Vital signs of children	6	0	1.00	1.00	Excellent
P40		Growth	6	0	1.00	1.00	Excellent
P41		Vital signs of children	5	1	0.83	0.82	Excellent
P42		Introduction to food	6	0	1.00	1.00	Excellent
P43		AIDPI	6	0	1.00	1.00	Excellent
P44		Growth	6	0	1.00	1.00	Excellent
P45		Development	6	0	1.00	1.00	Excellent
P46		Growth	6	0	1.00	1.00	Excellent
P47		Development	6	0	1.00	1.00	Excellent
P48		Growth	6	0	1.00	1.00	Excellent
P49		Growth	6	0	1.00	1.00	Excellent
P50		Clinical assessment of children	5	1	0.83	0.82	Excellent

Note: CVI - Content Validity Index; AIDPI - Integrated Care for Childhood Illnesses; BP - Blood Pressure; GD - Growth and Development.

Table 1. Continued...

ID	Question type	Question topic	Agreements	Disagreements	CVI	Kappa	Assessment
P51	Multiple Choice Questions	Ferrous sulfate supplementation	5	1	0.83	0.82	Excellent
P52	Questions without hints and 30 second answer time	Introduction to food	5	1	0.83	0.82	Excellent
P53		Vitamin A supplementation	5	1	0.83	0.82	Excellent
P54		GD consultation	5	1	0.83	0.82	Poor
P55		Neonatal jaundice	4	2	0.67	0.56	Excellent
P56		Introduction to food	6	0	1.00	1.00	Excellent
P57		Expression and storage of breast milk	5	1	0.83	0.82	Excellent
P58		Prematurity	6	0	1.00	1.00	Excellent
P59		Vaccination	6	0	1.00	1.00	Excellent
P60		Anthropometry	5	1	0.83	0.82	Excellent

Note: CVI - Content Validity Index; AIDPI - Integrated Care for Childhood Illnesses; BP - Blood Pressure; GD - Growth and Development.

As for characterization, participants' mean age was 38 years (SD=10.20), with a minimum of 25 and a maximum of 62 years. The mean Fehring score was 10.17 (SD=3.46), with a minimum of 5 and a maximum of 16. All of them had at least some nursing training, nine (75.0%) had clinical experience in the subject, eight (66.6%) had a PhD, and five (41.6%) had teaching experience in child health.

Table 1 presents data on inter-rater agreement in the assessment of game challenges. Among the 60 challenges assessed by experts, 51 were approved with excellent agreement and considered validated, and of these, 32 obtained absolute agreement rates. In addition, four obtained poor agreement and five did not obtain agreement.

The challenges that did not show agreement were reviewed, adapting them to experts' suggestions and adjustments implemented to consider the items as validated. It was found that, in some challenges, disagreements occurred due to issues unrelated to the content to be validated, but there was insertion of information that could not be included in the challenges, due to the game's proposal. Therefore, suggestions were carefully assessed, and those that were pertinent according to the authors' judgment were met. Considering the achievement of the objectives established with the card adjustment process, new rounds of theoretical validity were not necessary.

Despite experts' recommendations, some suggested modifications were not followed, maintaining fidelity to the pedagogical objective and scientific literature. For instance, it was decided to include the possibility of guidance on alternative feeding in specific cases where breastfeeding is not viable, an approach that, although it may raise doubts, prepares students for real challenges in clinical practice. Another aspect preserved was the use of the term "hints", more familiar to players and appropriate to the game format, instead of "additional information" (Chart 2).

The game was assessed by the 12 experts participating in the study regarding pedagogical aspects of the proposal and appearance of the board and cards, obtaining excellent agreement on all items assessed and without requiring adjustments, as shown in Table 2.

Thus, after adjustments based on consultation with experts in both card content assessment and assessment of pedagogical aspects and appearance, the final version of *PedCresce* was reached (Figure 1).

DISCUSSION

The search for student-centered methodologies based on active teaching-learning strategies has driven the creation of educational technologies for complex areas such as health.[30] The implementation of educational games in nursing, such as *PedCresce*, contributes to the development of essential skills by challenging students to reflect on topics and problem situations, potentially strengthening knowledge, clinical reasoning, critical thinking and decision-making, elements that are crucial for quality healthcare for children.[31-33]

Studies show that educational games can promote engagement and content retention in an interactive way, improving learning and the ability to apply knowledge in practical situations.[31,32] Therefore, the validity of educational technologies, such as board games, computer-based games, booklets, educational videos, among others, has contributed not only to undergraduate education, but also to in-service teaching and health education actions.[34]

The implementation of games in health education has demonstrated significant potential to improve knowledge, behaviors and engagement among students.[35,36] They offer an interactive and engaging way to approach complex health concepts, promote healthy lifestyles, and foster social interaction.[35] However, challenges such as content accuracy and relevance and game complexity need to be well planned to maximize their educational impact.[37] Therefore, carrying out studies that assess the results of their implementation are essential to advance the understanding of the benefits of board games in training and to strengthen the teaching-learning process.

The literature reveals that board games and other educational technologies applied to health have provided significant gains in learning, especially in the development of practical and interactive skills that prepare students for real scenarios.[38] A study

Table 2. Assessment of pedagogical aspects and appearance of the *PedCresce* game board and cards. Goiânia, GO, Brazil, 2023.

Pedagogical aspects and appearance	Agreements	Disagreements	Kappa	Assessment
Consistent with nursing students' educational needs	12	0	1.00	Excellent
Contributes to the quality of teaching and learning in child health	12	0	1.00	Excellent
Contributes to nursing consultation for children in the context of Primary Health Care	12	0	1.00	Excellent
It can circulate in the scientific/educational environment in nursing	12	0	1.00	Excellent
It can be used by nursing professionals as well as students	12	0	1.00	Excellent
The game encourages deeper studies on the topic	12	0	1.00	Excellent
The game's challenges support clinical reasoning in nursing when caring for children	12	0	1.00	Excellent
The challenges presented by the game cover key aspects of the topic	11	1	0.92	Excellent
The game cards are presented clearly	11	1	0.92	Excellent
The game cards are presented in an objective manner	11	1	0.92	Excellent
The game cards and proposed answers are aligned with scientific literature	11	1	0.92	Excellent
The cards are written with correct spelling and agreement	12	0	1.00	Excellent
The writing style corresponds to the level of education of the target audience (nursing students)	12	0	1.00	Excellent
The board illustrations are visually pleasing	11	1	0.92	Excellent
The game's colors are visually pleasing	12	0	1.00	Excellent

Chart 2. Adjustments made to challenges that did not reach agreement among reviewers. Goiânia, GO, Brazil, 2023.

Challenge	Version of the challenge submitted for expert assessment (freely translated)	Considerations and suggestions	Adjustments made	Version after feedback from experts (freely translated)
P02	***Xerophthalmia and protein-energy malnutrition can be signs of?*** *Hints:* 1. It can be avoided by using a vitamin supplement; 2. Its prevention is offered free of charge in basic health units in areas with epidemiological relevance for this condition; 3. Prophylaxis can be done by six-monthly megadoses of 100,000 IU and 200,000 IU depending on the child's age; 4. It is a hypovitaminosis. *Response:* Vitamin A deficiency.	"Perhaps in the hint, insert that it can lead to the child's blindness." "It would be interesting to change "hints" to "additional information" or "prevention" and write the information more clearly and objectively." "I thought about perhaps improving the wording of hint 1: it can be prevented through specific vitamin supplementation. It may be that not all supplements have vitamin A."	Hints 1 and 4 have been reworded. The term "hints" was kept to suit the game's characteristics.	***Xerophthalmia and protein-energy malnutrition can be signs of?*** *Hints:* 1. It can be avoided through specific vitamin supplementation; 2. Its prevention is offered free of charge in basic health units in areas with epidemiological relevance for this condition. 3. Prophylaxis can be done by; six-monthly megadoses of 100,000 IU and 200,000 IU depending on the child's age; 4. It can lead to blindness in children. *Response:* Vitamin A deficiency.

Note: CVI - Content Validity Index; AIDPI - Integrated Care for Childhood Illnesses; NB - newborn.

Chart 2. Continued...

Challenge	Version of the challenge submitted for expert assessment (freely translated)	Considerations and suggestions	Adjustments made	Version after feedback from experts (freely translated)
P04	***It is a change commonly found in newborns and can be physiological or pathological. What is this condition?***	"According to the current recommendations of the Brazilian Society of Pediatrics, exposure to sunlight should be indicated for newborns who have jaundice, but not as a factor to avoid, given that direct sunlight exposure can cause damage to the skin. Exclusive breastfeeding is a common and important guideline that can reduce the risk of jaundice."	Hint 4 was modified: "sun exposure" was replaced by "exclusive breastfeeding", as this is a common and important piece of advice that can reduce the risk of jaundice.	***It is a condition commonly found in newborns and can be physiological or pathological. What is this condition?***
	Hints:	"Check whether sunbathing is still recommended by the Brazilian Society of Pediatrics."		*Hints:*
	1. Elevated bilirubin;		Hint 2 has been reworded: phototherapy can be used in some cases.	1. Elevated bilirubin;
	2. It is treated with phototherapy;	"Hint 2: Phototherapy may be indicated in the treatment of some cases. In pathological cases, phototherapy is not always recommended (i.e., cholestasis). Hint 4: review the literature; I recently read that sunbathing is not recommended to improve/prevent jaundice."		2. Phototherapy may be used in some cases;
	3. The liver does not process red blood cells;			3. The liver does not process red blood cells;
	4. A common guideline to avoid it is sun exposure.			4. A common guideline to avoid it is exclusive breastfeeding.
	Response:			*Response:*
	Jaundice (neonatal).			Jaundice (neonatal).
P08	***What vaccines are given at birth?***	"You can include as additional information that BCG is administered in the health unit (in most municipalities) and hepatitis B is administered in the maternity ward."	The first suggestion was not accepted, as this question does not have a format that allows for the inclusion of hints or additional information.	***What vaccines are given at birth?***
	Response:	"See names of vaccines in the National Immunization Program to put on the response card."	Adequacy was verified according to the nomenclature used in the National Immunization Program.	*Response:*
	BCG and hepatitis B.			BCG vaccine (single dose). *Diseases prevented: severe forms of tuberculosis (miliary and meningeal).* **Hepatitis B vaccine (recombinant HB)** *Disease prevented: hepatitis B.*

Note: CVI - Content Validity Index; AIDPI - Integrated Care for Childhood Illnesses; NB - newborn.

Chart 2. Continued...

Challenge	Version of the challenge submitted for expert assessment (freely translated)	Considerations and suggestions	Adjustments made	Version after feedback from experts (freely translated)
P10	***Name at least two risk factors associated with child development problems.*** *Response:* Must contain two of the following: Absence or incomplete prenatal care; Problems during pregnancy; Prematurity (< 37 weeks); Low weight (< 2,500 g); Serious illnesses such as trauma, meningitis and seizures.	"Insert reference for childcare". "I suggest reviewing the risk factors in the most current version of the booklet, with the 3rd edition being published in 2021. It has 10 items listed as risk factors, including environmental risks related to violence."	The factors presented in the Child Health Booklet were included.	***List at least two risk factors associated with child development problems.*** *Response:* Must contain two of the following: · Environmental risks such as domestic violence, maternal depression, drug or alcoholism among household members, suspected sexual abuse, etc.; · Presence of infections during the gestational period (STORCH + Zika); · Prenatal care not performed or incomplete; · Problems during pregnancy, labor or birth; · Prematurity (<37 weeks); · Weight below 2,500 grams · Severe jaundice; · Hospitalization during the neonatal period; · Serious illnesses such as meningitis, head trauma and seizures; · Kinship between parents.
P11	***Name at least two physical changes associated with risk to child development.*** *Response:* Must contain two of the following: Oblique palpebral fissure;	"The listed head circumference is consistent with changes in full-term newborns. It is important to add this information. Head circumference <31.5 for girls and <31.9 for full-term boys at risk." "Very similar question to 10. Maybe rephrase." "Review the changes indicated in the notebook. Head circumference - indicate the reference in Z scores and not in the measurement value. In the notebook, provide the description in Z score - page 78 of the third edition, 2021".	Item 2 was reformulated with the inclusion of the description in accordance with the Child Health Booklet.	***Name at least two physical changes associated with risk to child development.*** *Response:* Must contain two of the following: Oblique palpebral fissure;

Note: CVI - Content Validity Index; AIDPI - Integrated Care for Childhood Illnesses; NB - newborn.

Chart 2. Continued...

Challenge	Version of the challenge submitted for expert assessment (freely translated)	Considerations and suggestions	Adjustments made	Version after feedback from experts (freely translated)
P11	NB's head circumference < 31.5 cm; Eyes set wide apart; Cleft lip; Short and/or wide neck; Single palmar crease.		Item 2 was reformulated with the inclusion of the description in accordance with the Child Health Booklet.	NB head circumference smaller than -2 Z scores or larger than +2 Z scores; Eyes set wide apart; Cleft lip; Short and/or wide neck; Single palmar crease.
P15	***At the beginning of the introduction of solid food, at six months, it is recommended, in addition to milk, two fruit purees and a lunch (porridge). When is it recommended to add porridge to dinner?*** *Response:* At 7 months.	"I suggest changing lunch (salty porridge/pot food) as it is in CAB 23". "Has Baby-Led Weaning been recommended by the Ministry of Health? I see professionals recommending starting with Baby-Led Weaning and not baby food." "Review the new food guide published in 2019. The term "porridge" has fallen into disuse. In fact, it is no longer recommended. At 6 months, it can be two fruits and lunch OR one fruit, lunch and dinner. At 7 months, the recommendation is two fruits, lunch and dinner, that is, 4 meals, in addition to breast milk or infant formula."	Experts' suggestions were gathered, the updated document on infant nutrition was consulted, and the wording of the question was corrected.	***At the beginning of the introduction of solid foods, at six months, it is recommended – in addition to milk – two fruits (mashed) and a lunch (cooked and mashed food). When is it recommended to add a meal to dinner?*** *Response:* At 7 months.
P18	***Name a danger sign in children over two months old, according to AIDPI.*** *Response:* Quote one of the following: · Vomits everything he eats; · Difficulty breathing or rapid breathing; · Unable to breastfeed or drink liquids; · Very sleepy with difficulty waking up; · Seizures; · Loss of consciousness.	"Perhaps include an assessment of the fontanelles." "According to Child AIDPI, 2017: the child cannot drink or breastfeed; the child vomits everything he/she eats; the child has had seizure or abnormal movements less than 72 hours ago; the child is lethargic or unconscious; the child has a capillary refill time > 2 seconds; if the child has nasal flaring and/or moaning".	It was updated as suggested by an expert.	***Name a danger sign in children over two months old, according to AIDPI.*** *Response:* Quote one of the following: Vomits everything he eats, Difficulty breathing, rapid breathing or moaning; Unable to breastfeed or drink liquids; Is lethargic or unconscious; Seizure or abnormal movement within the last 72 hours.

Note: CVI - Content Validity Index; AIDPI - Integrated Care for Childhood Illnesses; NB - newborn.

Chart 2. Continued...

Challenge	Version of the challenge submitted for expert assessment (freely translated)	Considerations and suggestions	Adjustments made	Version after feedback from experts (freely translated)
P19	***Name two signs of dehydration that a child may present.***	"Changes in the fontanelle are an important finding, and it would be important to be present in the player's response. It is one of the signs indicating dehydration – depression in the fontanelles. The nurse performs this assessment in the anamnesis."	The terms were adjusted according to child AIDPI (2017).	***Name two signs of dehydration that a three-month-old infant may present.***
	Response:	"It would be interesting to include the child's age."		*Name two of the following:*
	Name two of the following:			Lethargic or unconscious;
	Sunken eyes;	"I suggest using AIDPI as a reference - define age range: Neonatal AIDPI or Child AIDPI".		Unable to drink or drinks very poorly;
	Little saliva;			Restless or irritable;
	Crying without tears;			Sunken eyes;
	Dry skin;			Dry, wrinkled skin that takes a long time to return;
	Little urine.			Drinks thirstily/eagerly.
P55	***In a child growth and development consultation, if it is observed that the child has all the developmental milestones, but there is one or more risk factors, what is the most appropriate approach?***	"Depending on the assessment, the patient should be referred for medical consultation."	Adjustments were made to alternatives c and d, after analyzing experts' suggestions.	***In a child growth and development consultation, if it is observed that the child has all the developmental milestones, but there is one or more risk factors, what is the most appropriate approach?***
	a. Praise the mother and advise her to continue stimulating the child;	"Continue observing and stimulating the child."		a. Praise the mother and advise her to continue stimulating the child;
	b. Recommend a neurological assessment;			b. Recommend a neurological assessment;
	c. Schedule a follow-up appointment in 60 days;			c. Continue observing and stimulating the child and schedule a follow-up appointment in 60 days;
	d. Schedule a follow-up appointment in 30 days.			d. Continue observing and stimulating the child and schedule a follow-up appointment in 30 days.
	Response: alternative D.			

Note: CVI - Content Validity Index; AIDPI - Integrated Care for Childhood Illnesses; NB - newborn.

carried out with undergraduate nursing students demonstrated that the use of a board game for teaching psychiatric nursing significantly improved students' knowledge and attitudes regarding identification and care for individuals with mental disorders, in addition to satisfaction with self-perceived learning.[39] Another study, also with undergraduate students, validated a board game for teaching nursing diagnoses, showing that the game impacted clinical reasoning for the correct identification of diagnoses and their respective indicators.[40]

Although there are other games focused on different topics, such as first aid, human papillomavirus infection, nursing mentoring, communication between children with cancer and healthcare professionals, and even meeting the needs of users in PHC,[41-45] there is no record of games focusing on the specific

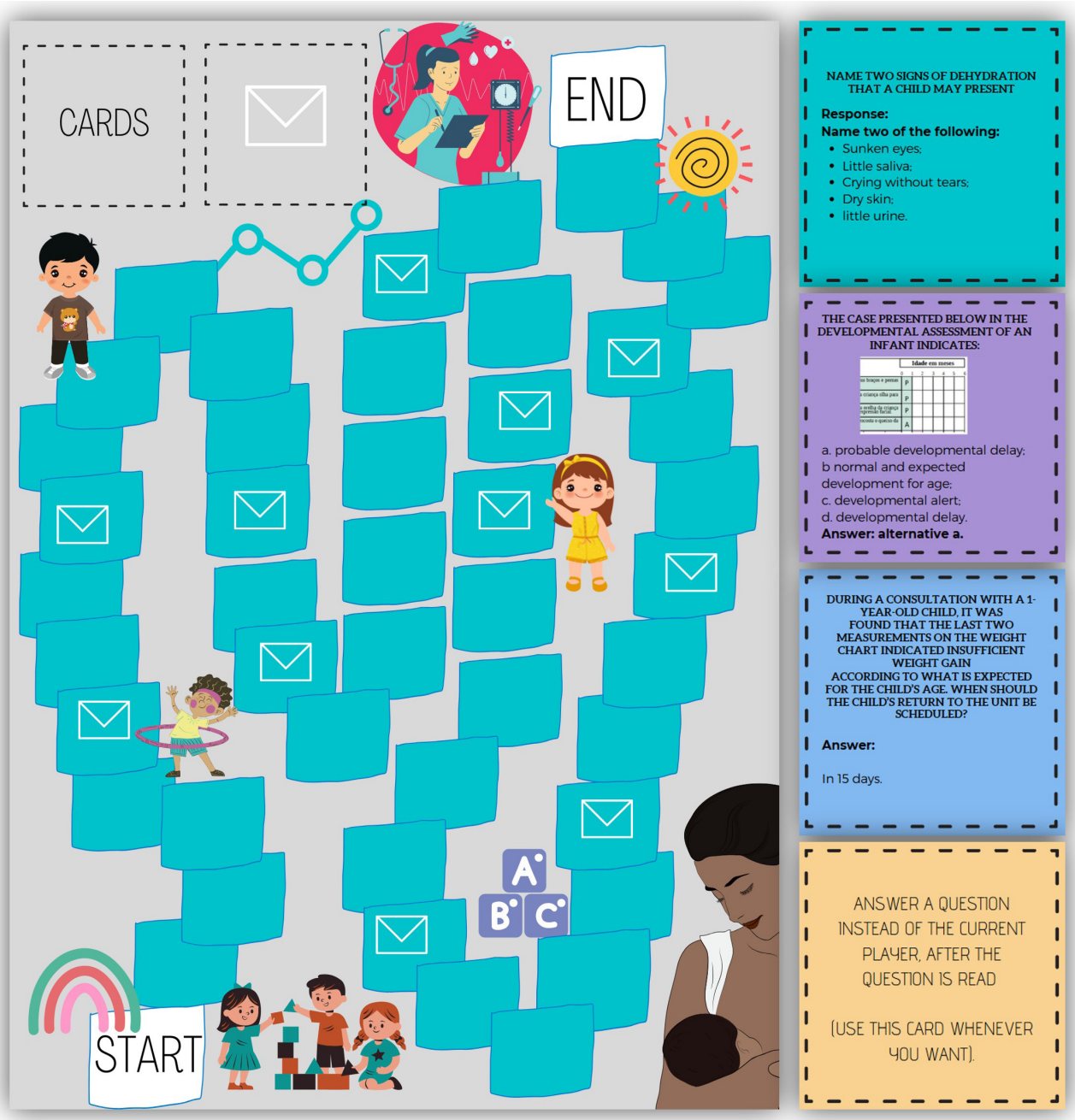

Figure 1. *PedCresce* game board and cards. Goiânia, GO, Brazil, 2023.

topic of child growth and development, a fundamental axis of PNAISC and essential for the training of professionals working in PHC.[25,46] Thus, *PedCresce* stands out not only for its topic and originality, but also for its rigorous validity methodology, ensuring that the content is consistent with best practices and guidelines.

During the validity process, *PedCresce* received positive assessments regarding its content, pedagogical potential and appearance, reinforcing its value as a teaching tool. Studies indicate that the validity of educational technologies, not only regarding content but also regarding these aspects, is essential to ensure the credibility and effectiveness of these resources in health education.[47,48] Validity by experts allows for necessary adjustments and adaptations to the real context of professional practice,[49] as occurred in the development of *PedCresce*, in which the content was aligned with updated scientific standards and suggestions from experts.[47]

Thus, in health training and practice, the use of validated educational technologies, such as *PedCresce*, combined with the implementation of active methodologies, reinforces the commitment to training for quality healthcare offered to children. Resources such as the one presented in this work can facilitate the integration of complex knowledge, providing learning environments that address issues of the professional context and encourage the construction of fundamental skills for nursing training and, consequently, for quality of healthcare.

CONCLUSION AND IMPLICATIONS FOR PRACTICE

The *PedCresce* board game, with 60 challenges, was developed based on scientific literature on a topic of relevance to public health for children. The educational technology was validated by experts, achieving more than 0.8 in the CVI and Kappa coefficient, and the assessments submitted by them demonstrate the potential of the tool to support the development of knowledge required by nurses in clinical practice within teaching child health. The main limitation of this study was the non-implementation of a playtest stage. However, future studies may students' and nurses' perception about *PedCresce*, especially regarding satisfaction and learning mediated by the game, aspects of gameplay and use to support the teaching-learning process, including continuing education in health.

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DATA AVAILABILITY RESEARCH

The contents underlying the research text are included in the article.

CONFLICT OF INTEREST

None.

REFERENCES

1. Souza LS, Jacob LMS, Lucena EES, Costa RRO. Experiências brasileiras no acompanhamento de crescimento e desenvolvimento infantil no contexto da Atenção Básica. Enfermagem em Foco. 2021 ago 30;12(2):407-13. http://doi.org/10.21675/2357-707X.2021.v12.n2.3722.
2. Araújo LA, Veloso CF, Souza MD, Azevedo JM, Tarro G. The potential impact of the COVID-19 pandemic on child growth and development: a systematic review. J Pediatr. 2021 ago 18;97(4):369-77. http://doi.org/10.1016/j.jped.2020.08.008. PMid:32980318.
3. Goldman RH, Zajac L, Geller RJ, Miller MD. Developing and implementing core competencies in children's environmental health for students, trainees and healthcare providers: a narrative review. BMC Med Educ. 2021 dez;21(1):503. http://doi.org/10.1186/s12909-021-02921-3. PMid:34560874.
4. Salehi AM, Mohammadi HA, Jenabi E, Khanlarzadeh E, Ashtari K. Quality of evidence and pedagogical strategy in using gamification in medical education literature: a systematic review. Simul Gaming. 2023 dez;54(6):598-620. http://doi.org/10.1177/10468781231195903.
5. Batista IT, Maia ICL, Rocha AS, Morais RS. Metodologias focadas na gamificação para o ensino superior na área da enfermagem: uma revisão integrativa. Revista Ibero-Americana de Humanidades. Ciênc Educ. 2023 abr 29;9(4):966-83.
6. Malicki A, Vergara FH, Van de Castle B, Goyeneche P, Mann S, Preston Scott M et al. Gamification in Nursing Education: An Integrative Literature Review. J Contin Educ Nurs. 2020 nov 1;51(11):509-15. http://doi.org/10.3928/00220124-20201014-07. PMid:33104811.
7. Aredes NDA, Dias DMV, Fonseca LMM, Campbell SH, Martins JCA, Rodrigues MA. E-baby skin integrity: evidence-based technology innovation for teaching in neonatal nursing. Esc Anna Nery. 2018;22(3). http://doi.org/10.1590/2177-9465-ean-2017-0424.
8. Webb M, Henderson B. G57(P) Gamification: Student feedback and creation of bespoke board games. Arch Dis Child. 2017 maio 1;102(Suppl 1):A24.
9. Kapp KM. The gamification of learning and instruction: game-based methods and strategies for training and education. Zürich: Pfeiffer; 2012.
10. Arruzza E, Chau M. A scoping review of randomised controlled trials to assess the value of gamification in the higher education of health science students. J Med Imaging Radiat Sci. 2021;52(1):137-46. http://doi.org/10.1016/j.jmir.2020.10.003. PMid:33153931.
11. Costa IKF, Tibúrcio MP, Costa IKF, Dantas RAN, Galvão RN, Torres GV. Development of a virtual simulation game on basic life support. Rev Esc Enferm USP. 2018;52:e03382. http://doi.org/10.1590/s1980-220x2017047903382. PMid:30403269.
12. Floryan M, Chow PI, Schueller SM, Ritterband LM. The model of gamification principles for digital health interventions: evaluation of validity and potential utility. J Med Internet Res. 2020;22(6):e16506. http://doi.org/10.2196/16506. PMid:32519965.
13. Zainuddin Z, Chu SKW, Shujahat M, Perera CJ. The impact of gamification on learning and instruction: A systematic review of empirical evidence. Educ Res Rev. 2020;30:100326. http://doi.org/10.1016/j.edurev.2020.100326.
14. Krath J, Schürmann L, von Korflesch HFO. Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. Comput Human Behav. 2021;125:106963. http://doi.org/10.1016/j.chb.2021.106963.
15. King CE, Kells A, Trout L, Yirinec A, Zhou S, Zurca AD. Gamification educational intervention improves pediatric nurses' comfort and speed drawing up code-dose epinephrine. J Pediatr Nurs. 2023;71:55-9. http://doi.org/10.1016/j.pedn.2023.03.013. PMid:37004310.
16. Cohen B, Nirappil J, Sokoloff W, McCabe ME, Broder M. 40. Chamily Challenge: the impact and efficacy of team-based gamification on pediatric resident engagement. Acad Pediatr. 2020;20(7):e20. http://doi.org/10.1016/j.acap.2020.06.061.
17. Woolwine S, Romp CR, Jackson B. Game on: evaluating the impact of gamification in nursing orientation on motivation and knowledge retention. J Nurses Prof Dev. 2019;35(5):255-60. http://doi.org/10.1097/NND.0000000000000570. PMid:31318733.
18. McClincy M, Seabol LG, Riffitts M, Ruh E, Novak NE, Wasilko R et al. Perspectives on the gamification of an interactive health technology for postoperative rehabilitation of pediatric anterior cruciate ligament reconstruction: user-centered design approach. JMIR Serious Games. 2021;9(3):e27195. http://doi.org/10.2196/27195. PMid:34448715.
19. Schultz K, Klein M, Sucharew H, McDonald J, DeBlasio D, Cooperstein E et al. The impact of a gamified curriculum using Kahoot! on musculoskeletal knowledge and skill acquisition among pediatric residents. Acad Pediatr. 2022;22(8):1265-70. http://doi.org/10.1016/j.acap.2022.02.003. PMid:35172199.

20. Yusoff MSB. ABC of content validation and content validity index calculation. Educ Med J. 2019 jun 28;11(2):49-54. http://doi.org/10.21315/eimj2019.11.2.6.
21. Cardinot A, McCauley V, Fairfield JA. Designing physics board games: a practical guide for educators. Phys Educ. 2022;57(3):035006. http://doi.org/10.1088/1361-6552/ac4ac4.
22. Fehring R. The Fehring model. In: Paquette M, Carroll-Johson P, editors. Classification of nursing diagnosis: proceedings of the tenth conference of North American Nursing Diagnoses Associations. Philadelphia: JB Lippincott; 1994.
23. Alexandre NMC, Coluci MZO. Validade de conteúdo nos processos de construção e adaptação de instrumentos de medidas. Cien Saude Colet. 2011 jul;16(7):3061-68. http://doi.org/10.1590/S1413-81232011000800006. PMid:21808894.
24. Cicchetti DV, Sparrow SA. Developing criteria for establishing interrater reliability of specific items: applications to assessment of adaptive behavior. Am J Ment Defic. 1981;86:127–37.
25. Brasil. Ministério da Saúde. Política Nacional de Atenção Integral à Saúde da Criança (PNAISC) [Internet]. Brasília: Ministério da Saúde; 2015 [citado 2024 set 13]. Disponível em: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2015/prt1130_05_08_2015.html
26. Brasil. Ministério da Saúde. Manual de quadros de procedimentos: Aidpi Criança: 2 meses a 5 anos [Internet]. Brasília: Ministério da Saúde; 2017 [citado 2024 set 13]. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/manual_quadros_procedimentos_aidpi_crianca_2meses_5anos.pdf
27. Brasil. Ministério da Saúde. Guia alimentar para crianças brasileiras menores de 2 anos - Versão Resumida [Internet]. Brasília: Ministério da Saúde; 2021 [citado 2024 set 13]. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/guia_alimentar_crianca_brasileira_versao_resumida.pdf
28. Brasil. Ministério da Saúde. Programa Nacional de Suplementação de Ferro: Manual de Condutas Gerais [Internet]. Brasília: Ministério da Saúde; 2013 [citado 2024 set 13]. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/manual_suplementacao_ferro_condutas_gerais.pdf
29. Weffort VR, Maranhão HD, Mello ED, Barretto JR, Fisberg M, Moretzsohn MD. Consenso sobre anemia ferropriva: atualização: destaques 2021 [Internet]. São Paulo: Sociedade Brasileira de Pediatria; 2021 [citado 2024 set 13]. Diretrizes, no. 2. Disponível em: https://www.sbp.com.br/fileadmin/user_upload/23172c-Diretrizes-Consenso_sobre_Anemia_Ferropriva.pdf
30. Hernon O, McSharry E, MacLaren I, Carr PJ. The use of educational technology in teaching and assessing clinical psychomotor skills in nursing and midwifery education: a state-of-the-art literature review. J Prof Nurs. 2023 mar 1;45:35-50. http://doi.org/10.1016/j.profnurs.2023.01.005. PMid:36889892.
31. Seymour A, Borggren M, Baker R. Escape the monotony: gamification enhances nursing education. J Emerg Nurs. 2023 nov 1;49(6):805-10. http://doi.org/10.1016/j.jen.2023.06.004. PMid:37422743.
32. Othman SY, Ghallab E, Eltaybani S, Mohamed AM. Effect of using gamification and augmented reality in mechanical ventilation unit of critical care nursing on nurse students' knowledge, motivation, and self-efficacy: A randomized controlled trial. Nurse Educ Today. 2024 nov 1;142:106329. http://doi.org/10.1016/j.nedt.2024.106329. PMid:39116661.
33. King CE, Kells A, Trout L, Yirinec A, Zhou S, Zurca AD. Gamification educational intervention improves pediatric nurses' comfort and speed drawing up code-dose epinephrine. J Pediatr Nurs. 2023 jul 1;71:55-9. http://doi.org/10.1016/j.pedn.2023.03.013. PMid:37004310.
34. López-Fernández D, Gordillo A, Alarcón PP, Tovar E. Comparing traditional teaching and game-based learning using teacher-authored games on computer science education. Ieee Trans Educ. 2021 mar 12;64(4):367-73. http://doi.org/10.1109/TE.2021.3057849.
35. Lickiewicz J, Hughes P, Makara-Studzińska M. The use of board games in healthcare teaching. Nursing Problems/ Problemy Pielęgniarstwa. 2020;28(2):71-4. http://doi.org/10.5114/ppiel.2020.98766.
36. Gauthier A, Kato PM, Bul KC, Dunwell I, Walker-Clarke A, Lameras P. Board games for health: a systematic literature review and meta-analysis. Games Health J. 2019 abr 1;8(2):85-100. http://doi.org/10.1089/g4h.2018.0017. PMid:30256159.
37. Cosimini MJ, Collins J. Card and board game design for medical education: length and complexity considerations. Korean J Med Educ. 2023 set;35(3):291-6. http://doi.org/10.3946/kjme.2023.267. PMid:37670525.
38. Chatzea VE, Logothetis I, Kalogiannakis M, Rovithis M, Vidakis N. Digital educational tools for undergraduate nursing education: a review of serious games, gamified applications and non-gamified virtual reality simulations/tools for nursing students. Information. 2024 jul 15;15(7):410. http://doi.org/10.3390/info15070410.
39. Wu CS, Chen MF, Hwang HL, Lee BO. Effectiveness of a nursing board games in psychiatric nursing course for undergraduate nursing students: an experimental design. Nurse Educ Pract. 2023 jul 1;70:103657. http://doi.org/10.1016/j.nepr.2023.103657. PMid:37207376.
40. Tinôco JD, Silva LS, Medeiros TM, Grande ME, Guedes ML, Fernandes MI et al. "Enfermeiro Diagnosticador" board game for teaching diagnostic reasoning in nursing: a quasi-experimental study. Acta Paul Enferm. 2023 fev 6;36: eAPE00001. http://doi.org/10.37689/acta-ape/2023AO000111.
41. Dutra BD, Nascimento KC, Echevarría-Guanilo ME, Sparapani VC, Lanzoni GMM. Validation of an educational game about first aid for schoolchildren. Rev Bras Enferm. 2021;74(6):e20201107. http://doi.org/10.1590/0034-7167-2020-1107. PMid:34431938.
42. Amador DD, Mandetta MA. Development and validation of a board game for children with cancer. Acta Paul Enferm. 2022;35:eAPE00121. http://doi.org/10.37689/acta-ape/2022AO00121.
43. Maciel MPR, Costa LMA, Sousa KHJF, Oliveira AD S, Amorim FCM, Moura LKB et al. Construction and validation of a serious game about human papillomavirus infection. Acta Paul Enferm. 2022;35:eAPE03012. http://doi.org/10.37689/acta-ape/2022AO03012.
44. Pollio EW, Patton EM, Nichols LS, Bowers DA. Gamification of primary care in a baccalaureate nursing education program. Nurs Educ Perspect. 2023 mar 1;44(2):126-7. http://doi.org/10.1097/01.NEP.0000000000000925. PMid:34966072.
45. Almeida IS, Pinto C, Lima A, Moreira T, Fernandes CS. Game4NurseSupervisor: development of a board game for Nursing Mentoring. Nurse Educ Pract. 2024 mar 1;76:103939. http://doi.org/10.1016/j.nepr.2024.103939. PMid:38479089.
46. Carvalho PD, Andrade LS, Oliveira WA, Masson L, Silva JL, Silva MA. Essential health promotion competencies in nursing training: An integrative review. Acta Paul Enferm. 2021 jul 14;34:eAPE02753. http://doi.org/10.37689/acta-ape/2021AR02753.
47. Pauline-Graf D, Mandel SE, Allen HW, Devnew LE. Assumption validation process for the assessment of technology-enhanced learning. Contemp Educ Technol. 2021;13(4):ep316. http://doi.org/10.30935/cedtech/11071.
48. SantAna Honorato EJ, Souza DC, Lemos SM, Silva TA, Carvalho ES, Monteiro AM, et al. The use of educational technologies in health: an integrating literature. Int J Innov Educ Res [Internet]. 2019 Jul. 1 [citado 2024 nov 04];7(7):177-9. Disponível em: https://scholarsjournal.net/index.php/ijier/article/view/1599
49. Alves SAA, Abreu LC, Cunha NDP, Almeida Júnior ÁD, Abreu CIPO, Meirelles ACA et al. Description of the scientific method for the preparation and validation of educational technologies in digital format: a methodological study. Revista Brasileira de Crescimento e Desenvolvimento Humano. 2023 maio 1;33(2):299-309. http://doi.org/10.36311/jhgd.v33.14615.

AUTHOR'S CONTRIBUTIONS

Study design. Bruna Gonçalves Gratão. George Oliveira Silva. Natália Del' Angelo Aredes.

Data acquisition. Bruna Gonçalves Gratão. Natália Del' Angelo Aredes.

Data analysis and interpretation of results. Bruna Gonçalves Gratão. George Oliveira Silva. Natália Del' Angelo Aredes.

Writing and critical review of the manuscript. Bruna Gonçalves Gratão. George Oliveira Silva. Natália Del' Angelo Aredes.

Approval of the final version of the article. Bruna Gonçalves Gratão. George Oliveira Silva. Natália Del' Angelo Aredes.

Responsibility for all aspects of the content and integrity of the published article. Bruna Gonçalves Gratão. George Oliveira Silva. Natália Del' Angelo Aredes.

ASSOCIATED EDITOR

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