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Educational technology on cleaning and disinfecting toys for school environments in the face of the COVID-19 pandemic

Tecnologia Educacional sobre limpeza e desinfecção de brinquedos para ambientes escolares frente à pandemia da COVID-19

Tecnología educativa en limpieza y desinfección de juguetes para ambientes escolares ante la pandemia COVID-19

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ABSTRACT

Objective: to describe the construction and validation, of content and appearance, of an educational technology on cleaning and disinfecting toys for school environments and daycare centers in the context of the coronavirus pandemic. **Method:** Validation methodological research, guided by the Psychometry theory. Three phases were carried out, namely: (1) bibliographic review, (2) elaboration of the educational technology, and (3) evaluation, improvement and validation of the content and appearance of the booklet. The participants were 20 evaluators and 16 professionals specialized in early childhood education. To ensure validation, we consider a Content Validity Index of at least 0.8. The data were treated using the Statistical Package for Social Science software and submitted to descriptive analysis of frequency distribution. **Results:** The global improvement and validation of the content was 0.99 for the evaluators and 0.96 for the target audience. The domains of the booklet showed improvement and content validation above 0.8, suggesting that this is a representative material, in terms of appearance and content. **Conclusion and implications for the practice:** In the context of educational activities in Nursing, the digital booklet can be considered as an instrument capable of favoring clear and reliable guidance on cleaning and disinfecting toys for school environments in the coronavirus pandemic scenario.

Keywords: School Health Services; Play and Playthings; Educational Technology; Validation Study; Coronavirus Infections.

RESUMO

Objetivo: descrever a construção e validação do conteúdo e aparência de tecnologia educacional sobre limpeza e desinfecção de brinquedos para ambientes escolares e creches, no contexto de pandemia do coronavírus. **Método:** Pesquisa metodológica de validação, orientada pela teoria da Psicometria. Realizada em três fases: (1) revisão bibliográfica (2) elaboração da tecnologia educacional (3) avaliação, aperfeiçoamento e validação do conteúdo e aparência da cartilha. Participaram 20 juízes e 16 profissionais da educação infantil. Para garantir a validação, consideramos o índice de validade de conteúdo de, no mínimo, 0,8. Os dados foram tratados no software *Statistical Package for Social Science* e submetidos à análise descritiva de distribuição de frequências. **Resultados:** O índice de validade de conteúdo global foi de 0,99 para juízes e 0,96 para o público-alvo. Os domínios da cartilha apresentaram índice de validade de conteúdo superior a 0,8 sugerindo que é um material representativo, quanto à aparência e conteúdo. **Conclusão e implicações para prática:** A cartilha digital pode ser considerada, no contexto das atividades educativas em enfermagem, instrumento capaz de favorecer orientações claras e confiáveis sobre a limpeza e desinfecção de brinquedos, para ambientes escolares, no cenário de pandemia do novo coronavírus.

Palavras-Chave: Promoção da Saúde Escolar; Jogos e brinquedos; Tecnologia Educacional; Estudo de Validação; Infecções por Coronavírus.

RESUMEN

Objetivo: describir la construcción y validación, en términos de contenido y apariencia, de tecnología educativa sobre la limpieza y desinfección de juguetes para ambientes escolares y guarderías en el contexto de la pandemia por coronavirus. **Método:** investigación metodológica de validación, guiada por la teoría de la Psicometría. Se realizó en tres etapas, a saber: (1) revisión bibliográfica, (2) elaboración de la tecnología educativa, y (3) evaluación, mejora y validación del contenido y la apariencia del folleto. Participaron 20 jueces y 16 profesionales de educación infantil. Para garantizar la validación, consideramos un Índice de Validez de Contenido mínimo de 0,8. Los datos se trataron en el software *Statistical Package for Social Science* y fueron sometidos a análisis descriptivo de distribución de frecuencias. **Resultados:** El Índice de Calidez de Contenido global fue de 0,99 para los jueces y de 0,96 para el público objetivo. Los dominios del cuadernillo presentaron un Índice de Validez de Contenido superior a 0.8, lo que sugiere que se trata de un material representativo, en términos de apariencia y contenido. **Conclusión e implicaciones para la práctica:** En el contexto de las actividades educativas en enfermería, el folleto digital puede considerarse como instrumento capaz de favorecer una orientación clara y confiable sobre la limpieza y desinfección de juguetes para ambientes escolares en el escenario pandémico del coronavirus.

Palabras clave: Servicios de Salud Escolar; Juego e Implementos de Juego; Tecnología Educativa; Estudio de Validación; Infecciones por Coronavirus.

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INTRODUCTION

The current worldwide pandemic scenario associated with Coronavirus Disease 2019 (COVID-19)[1] that has SARS-CoV-2 (*Severe Acute Respiratory Syndrome-Coronavirus*)[2] as its etiologic agent affects everyone, and we still do not know what the long-term changes will be. Thus, preventive measures against contamination have become urgent and necessary. Several countries like Brazil have adopted measures to slow down the transmission of COVID-19, such as physical distance, use of facial masks, frequent hand hygiene and of the frequently touched environments and surfaces, and even the suspension of classroom activities[3].

There are relatively few cases of COVID-19 in children, when compared to the general population, representing from 1% to 5% of the diagnosed cases; however, the child group can develop severe COVID-19, and a not insignificant number of cases may show a very severe multi-systemic inflammatory condition with some characteristics similar to Kawasaki's disease and toxic shock syndrome[4-6].

In Brazil, until March 1st, 2021, 8,774 children up to five years of age were hospitalized due to Severe Acute Respiratory Syndrome due to COVID-19 and, of these, 627 died. Mortality was higher among children up to one year of age, totaling 420 lives lost[7,8]. This scenario shows the magnitude of the problem in the child population.

Thus, we recognize that investing in educational strategies for professionals in early childhood education and elementary education as a way to prevent Coronavirus becomes relevant, as it may slow down the transmission of the virus, helping the local health systems to assist within their capacity and allow time for the production of consistent scientific evidence on the cure and/or eradication of this disease[9].

In this study, we start from the premise that, among the different forms of prevention of COVID-19, is the production and use of reliable educational material on the theme of cleaning and disinfecting toys. Cleaning and disinfecting toys has been recommended as a way of reducing the spread and preventing contamination by the Coronavirus as they are objects or surfaces that are frequently touched and potentially contaminated[10,11]. It is well known that, especially in school environments and daycare centers, toys are objects that are very manipulated and shared by the children, and can be taken to their mouths and be in direct contact with the floor or other dirty and contaminated surfaces.

A systematic review of the persistence of the new Coronavirus on inanimate surfaces reveals that SARS-CoV-2 can persist in metal, glass or plastic for up to nine days and can be effectively inactivated by disinfection procedures using, for example, ethanol (62% to 70%), 0.5% hydrogen peroxide or 0.1% sodium hypochlorite[10]. Even more recent data indicate its survival for up to seventeen days on surfaces, which contributes to contagions and to the accelerated spread of this pathogen[12].

We have not found specific studies on SARS-Cov-2 in objects such as toys, although there is evidence that toys are the most common ways to promote the spread of microorganisms among children, especially when associated with inadequate hand hygiene[13-15]. Studies that analyzed the presence of microorganisms in different types of toys such as metal, plastic, fabric and others point out these objects as reservoirs of microorganisms that cause infections[16,17,18]. As toys can contribute to the spread of diseases, it is recommended that there be a routine for cleaning and disinfecting them, but it is observed that, in the practice, little attention is paid to this issue[16,18].

In our daily lives we have identified a discourse that, in school environments, there are risks of an accelerated spread of the new Coronavirus. This discourse has been supporting managers in Brazil and the world in the decision to suspend face-to-face activities, although the social losses are immeasurable. In this sense, the educational technology herein produced, although not responding to all the demands of early childhood education for the prevention of COVID-19, contributes with relevant and reliable information that can be used by nursing and education professionals in educational activities, with a view to school health promotion.

The educational material produced for validation in this research refers to guidelines related to the cleaning and disinfection of different types of toys for educational use in spaces such as schools and daycare centers. We recognize that educational materials must be reliable, accessible, clear, meaningful and appropriate to the reader's reality. Nurses must produce educational material in a properly planned manner, carrying out the evaluation and validation of the material to meet the real demands of the context[19].

In this research, we start from the understanding that education in health is a process that must provide reflections and allow for meaningful learning, favoring changes in attitudes and building up autonomy, given a reality that needs to be transformed[20]. Educational material is a resource for education in health as it may support teaching and learning processes. And there is evidence that its use has been shown to be relevant in the care practice, contributing to access to knowledge. In this context, nurses can use it to develop attitudes and skills, in a target audience, with a view to preventing diseases and promoting health.[19]

There is no consensus in the literature on the method of cleaning toys in school environments or health services[21], which reinforces the relevance of this study. We recognize that, in a context of lack of consensus and scarcity of evidence, it is opportune to validate by experts and target audience the content of the educational material to enable the dissemination of reliable guidelines.

Considering the above, the objective was to describe the construction and validation of the content and appearance of an educational technology on cleaning and disinfecting toys for school environments and daycare centers in the context of the coronavirus pandemic.

METHOD

A methodological research study, of a descriptive character and with a quantitative approach, for the development, evaluation,

improvement and validation of an educational material. Studies of this nature are of a non-experimental type and the focus is on the development of new reliable instruments for the Nursing practice[22].

Previously, at the beginning of the research, this study was approved by the Research Ethics Committee of the Federal University of São João del Rei (*Universidade Federal de São João del Rei*, UFSJ), according to opinion No. 31748520.8.0000.5545. The entire process of researching and using the data followed the terms set forth in Resolution No. 466 of December 12th, 2012, of the National Health Council, on research involving human beings.

This validation study was carried out considering three phases: Phase 1: Bibliographic review on cleaning and disinfecting toys and the ways of transmission, dissemination and prevention of the new Coronavirus; Phase 2: Elaboration of the Booklet; and Phase 3: Evaluating, improving and validating the content and appearance of the booklet by the judges and target audience, for producing its final version.

For elaborating the digital booklet, we looked for theoretical and methodological information on the production of educational material in the health area. Therefore, we observed the following stages: (1) definition of the theme; (2) bibliographic research; (3) elaboration of the script, chapters and content; (4) development of the booklet; and (5) version of the digital booklet for validation[19].

For the review, we searched for scientific articles, full and available online, published in the last five years (2015 - 2020), in Portuguese, English and Spanish using the *"School Health Promotion", "Games and Toys", "Educational Technology", "Validation Study" and "Coronavirus Infections"* descriptors, and using the Boolean operator AND. The search was carried out in April 2020, in the following databases: *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (*Lilacs*) (5 publications), *Biblioteca Virtual de Saúde* (BVS), (6 publications), and International Literature in Health Sciences (*Medline*) (23 publications). Associated with this, searches were made for Technical Manuals, Standards and Resolutions in Specialized Institutions' websites that produce material of interest, namely: Ministry of Health, Brazilian Society of Pediatrics, Brazilian Society of Infectious Diseases, Center for Disease Control and Prevention in the United States (CDC), National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária*, ANVISA) and the World Health Organization (WHO). After the material has been read, 19 productions supported the construction of the booklet.

To reach the target audience, the digital booklet will be widely disseminated and will be available for access, from a link, on different social media and on a blog organized by the researchers of this study. We will also make the disclosure by electronic mail, sending the material to municipal departments of Education and to the network of researchers of the authors of this article.

As a validation method, we adopted the Psychometry theory[23], which is anchored in three poles: theoretical, experimental and analytical. The theoretical pole focuses on the prior foundation and validation of the construct and is useful for conducting research studies that deal with the construction and validation of tools[21]. In this study, only the procedures of the theoretical pole were addressed, considering that the object of this research was an educational material, a digital booklet.

The study population consisted of two groups: the judges, teaching researchers at the proposing institution; and education professionals, the target audience. With regard to the group of judges, the eligible population was composed of 150 research professors from the Pharmacy, Medicine, Nursing and Biochemistry courses. Aiming at inclusion in the study, the Fehring Model[24] expert scoring system was applied through consultation in the lattes curriculum, which assigns points according to degree, specialization, scientific production, knowledge and time of experience with the theme under discussion. A total of 45 researchers obtained the minimum score of five points. According to the model, they were considered fit and, therefore, were invited to participate. Of these, 20 agreed to be part of the research.

As for the target audience, the eligible population consisted of an education professional from each public early childhood and elementary school in the municipality of the proposing institution, totaling 50 educators. As a criterion for the inclusion of these professionals, experience of at least one year in early childhood education and/or elementary education was established. After the invitation, 16 professionals agreed to participate in the study, constituting the target audience.

It is to be noted that a minimum number of nine judges[25] is necessary to promote the validation of educational material. Therefore, the sample obtained from participants in both groups was considered sufficient.

The booklet was submitted to the evaluation of the judges and the target audience. To carry out data collection, which took place between June and August 2020, two objective instruments developed by the authors and applied through electronic mail were used. The judges answered the form, containing questions about the technical aspects of the booklet's content, such as consistency, effectiveness, capacity, potential, text, spelling and aesthetics. The form for education professionals contained questions about the content of the booklet and elements related to the educational capacity in health. Thus, it was possible to obtain objective measures, that is, it was possible to quantify the participants' opinion in relation to the booklet. At the end of each question, the participants could justify their answers and/or make suggestions regarding the educational material.

The data collected were tabulated in the Microsoft Excel 2003 program, and the consistency of the information was observed. For the analysis, we used the Statistical Package for Social Science software, version 23.0 (SPSS Inc., Chicago, IL.) A descriptive analysis of all the investigated variables was carried out through the distribution of frequencies.

The Content Validity Index (CVI) was used to measure the experts' agreement regarding the items evaluated. The calculation considered the sum of the number of judges or target audience members that assessed the item as fully adequate + adequate + partially adequate divided by the number of judges or target

audience members[25]. In order to evaluate the booklet in a broad manner and as a whole, the Global Content Validity Index was calculated, adding up all the CVIs calculated separately and dividing by the number of items in the instrument[26].

To determine the adequacy and relevance of each item addressed in the assessment instrument, a minimum CVI of 0.8[27] was considered for judges and target audience. The participants' suggestions and recommendations were analyzed based on the scientific literature and those which were relevant to the objective of the booklet, were incorporated in the final version.

RESULTS

Description of the elaboration and constitution of the digital booklet

The literature review allowed elaborating a script and the chapters with the contents of the booklet. To develop its art and design, we used the Canva®[28] program, a graphic design platform that allows for the creation of media, infographics, posters and other visual content in a completely online fashion, using text and images that made up the version that was submitted to the participants. Among the positive aspects of this tool, there is free access, the possibility of different researchers working simultaneously on reviewing and editing the material and the variety of layouts and figures favoring the production of a visually attractive material. Four researchers who participated in this study took part in the edition of the booklet, using Canva®[28].

During the edition of the booklet, using Canva®[28], the template model adopted was the *Teal and Pink Animals Daycare Flyer*, the color palette used was white, black, green, yellow, red, blue and pink, and the font size was 21 for titles and 16 for the body of the text. The illustrations used were available for free in Canva®[28] and were found by searching for the terms "toys" and "stars". We also used Google images, available for free and in the public domain, by means of a search, using the terms "wooden toys", "children illustration", "hand washing illustration", "wooden toys illustration" and "cleaning products illustration".

In the educational material, we adopted the definitions of the Centers for Disease Control and Prevention (CDC) for cleaning and disinfection, for which cleaning is defined as the removal of germs, dirt and impurities from surfaces or objects and works using soap (or detergent) and water to physically remove germs from surfaces, and disinfection is understood as the destruction of germs on surfaces or objects and works using chemicals (disinfectants)[29].

The final booklet entitled *Learning and fun with safety: cleaning and disinfecting toys in schools and daycare centers in the context of the new coronavirus pandemic*, is 210x297 mm in size and has 26 pages, consists of pre-textual (cover, back cover, catalog card, summary and presentation), textual (chapters on Coronavirus, ways of transmission, contagion and prevention, why cleaning and disinfecting toys and what the difference is between cleaning and disinfection, a detailed description of how to clean and disinfect different types of toys – plastic, rubber, wood, metal, plush, cloth, cardboard) and post-textual (important tips, knowledge test, bibliographic references) components. In Figure 1, some pages of the final version of the booklet are shown.

For situations that may come to involve the need to print educational material, we recommend printing on A4 size paper, considering the dimensions of the booklet.

Content and appearance validation

A total of 36 participants contributed to the evaluation of the booklet and we identified that the majority are female (80% of the judges and 100% of the target audience) and with more than five years of experience in university education (80%) or basic education (100%). Among the participating judges, 75% (n=15) have a degree in Nursing and 90% have a PhD. Despite the expressive number of respondent nurses, the research counted on the participation of researchers with training in other areas such as Psychology (n=1), Medicine (n=2), art (n=1) and Pharmacy (n=1).

The judges' assessment of the booklet's consistency with the cleaning and disinfection needs and stages, its usefulness and effectiveness in the health educational process, ability to be used as educational technology and to be in accordance with the socio-cultural level of the target audience, obtained a CVI of 1.0. The capacity to promote changes and attitudes obtained a CVI of 0.9. These findings are shown in Table 1.

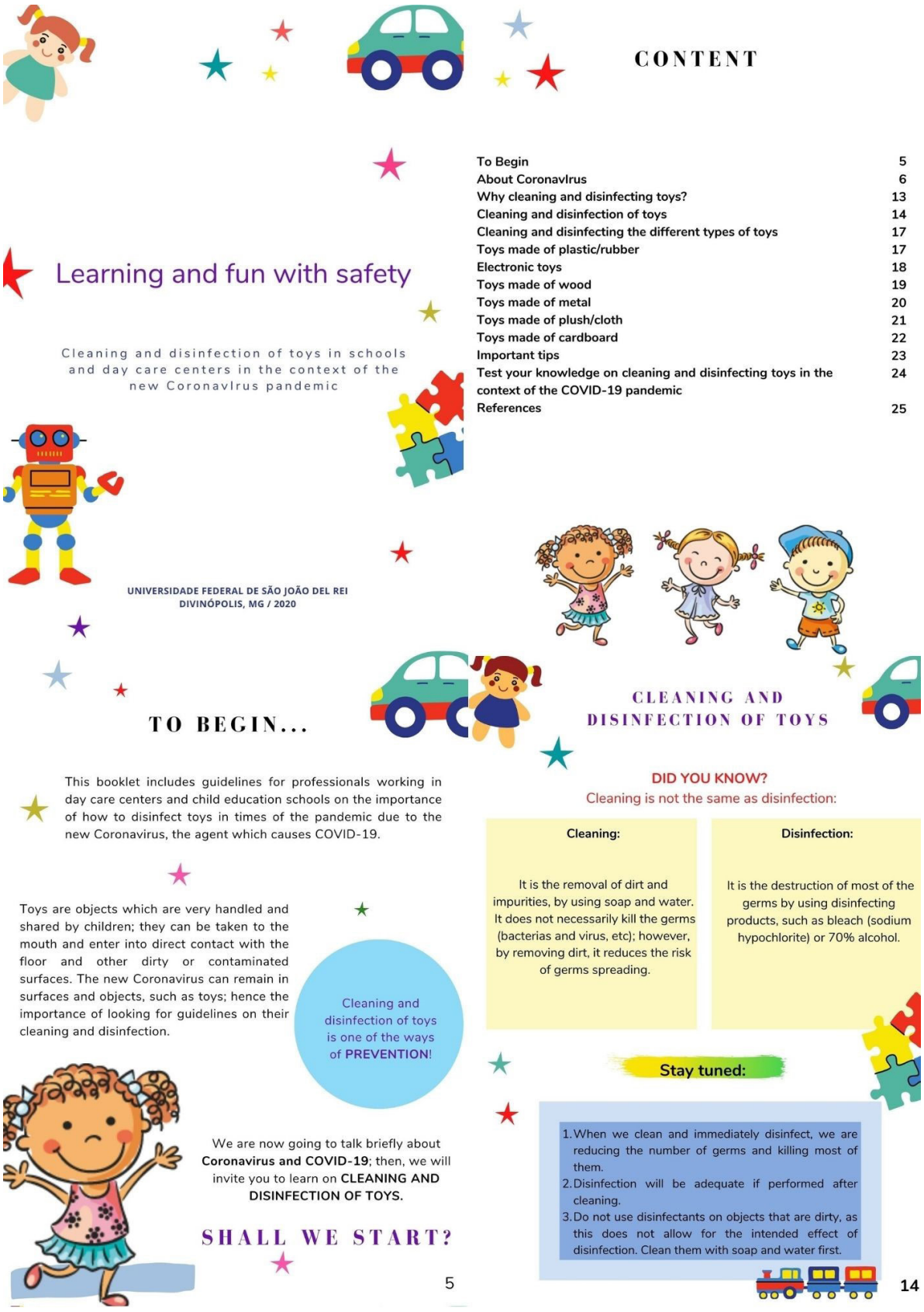
The judges' assessment of the textual aspects (clarity and scientificity of the information), agreement, spelling and appearance (illustrations, aesthetics, number of pages, size of titles and topics) obtained a CVI of 1.0. Concerning the logical sequence of the content provided in the booklet, the agreement was 0.9. This information is shown in Table 2.

The assessment by the target audience about the sequence, organization, clarity of writing and approach to the necessary subject matters and appearance (pertinence and adequacy of the illustrations) obtained a CVI of 1.0. Concerning the booklet's ability to generate interest and motivate reading, an agreement of 0.8 was obtained. All the participants from the target audience group agreed that the educational material has the ability to promote attitude and reflection on the theme (CVI = 1.0). Regarding the booklet's ability to draw the attention, the CVI was 0.9. These results are shown in Table 3.

The results for the global CVI showed a high level of agreement, that is, 0.99 for the judges and 0.96 for the target audience. Even so, we submitted their suggestions for analysis, based on scientific evidence, and incorporated those that were within the scope of the proposed material and that could contribute to the quality of the booklet. In Chart 1, we present the adjustments and corrections that were incorporated in the educational material, as well as the research participants' opinions, grouped by nuclei of meaning, about the material produced.

DISCUSSION

Regarding the validation process, we consider that the professional diversity of the judges and their qualifications (90%



CONTENT

Learning and fun with safety

Cleaning and disinfection of toys in schools and day care centers in the context of the new Coronavlrus pandemic

UNIVERSIDADE FEDERAL DE SÃO JOÃO DEL REI
DIVINÓPOLIS, MG / 2020

TO BEGIN...

This booklet includes guidelines for professionals working in day care centers and child education schools on the importance of how to disinfect toys in times of the pandemic due to the new Coronavirus, the agent which causes COVID-19.

Toys are objects which are very handled and shared by children; they can be taken to the mouth and enter into direct contact with the floor and other dirty or contaminated surfaces. The new Coronavirus can remain in surfaces and objects, such as toys; hence the importance of looking for guidelines on their cleaning and disinfection.

Cleaning and disinfection of toys is one of the ways of **PREVENTION**!

We are now going to talk briefly about **Coronavirus and COVID-19**; then, we will invite you to learn on **CLEANING AND DISINFECTION OF TOYS.**

SHALL WE START?

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CLEANING AND DISINFECTION OF TOYS

DID YOU KNOW?
Cleaning is not the same as disinfection:

Cleaning:

It is the removal of dirt and impurities, by using soap and water. It does not necessarily kill the germs (bacterias and virus, etc); however, by removing dirt, it reduces the risk of germs spreading.

Disinfection:

It is the destruction of most of the germs by using disinfecting products, such as bleach (sodium hypochlorite) or 70% alcohol.

Stay tuned:

1. When we clean and immediately disinfect, we are reducing the number of germs and killing most of them.
2. Disinfection will be adequate if performed after cleaning.
3. Do not use disinfectants on objects that are dirty, as this does not allow for the intended effect of disinfection. Clean them with soap and water first.

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Figure 1. Some Pages of the Final Version of the Portuguese version of the Booklet.
Source: Pages of the Booklet, Brazil; 2020.

Table 1. Judges' assessment of the booklet's content. Divinópolis, MG, Brazil, 2020. N=20

Item evaluated	Totally adequate	Adequate	Partially adequate	CVI*
Coherence with the cleaning and disinfection needs	16	2	2	1.0
Coherence with the cleaning and disinfection stages	16	1	3	1.0
Coherence with the usefulness in the health educational process	16	3	1	1.0
Effectiveness for use by adults	12	6	2	1.0
Effectiveness for use by professionals in early childhood and elementary education	16	2	2	1.0
Ability to comply with the socio-cultural level	15	4	1	1.0
Ability to promote changes and attitudes**	7	9	3	0.9
Ability to portray themes that are essential to cleaning and disinfection	8	1	1	1.0
Ability to transfer and generalize learning	13	4	3	1.0
Ability to be used as an educational technology	12	5	3	1.0
Potential to circulate among school professionals	16	2	2	1.0

Source: Research data, Divinópolis, MG, Brazil; 2020
* CVI = Content Validity Index ** One expert did not answer

Table 2. Judges' evaluation of the booklet in terms of textual, spelling and aesthetic aspects. Divinópolis, MG, Brazil, 2020. N=20

Item evaluated	Totally adequate	Adequate	Partially adequate	CVI*
Clear and objective information	9	3	1	1.0
Scientifically correct information	11	7	2	1.0
Coherent cover, back cover, summary and presentation information	16	4	0	1.0
Information structured in agreement and spelling	17	2	1	1.0
Logical sequence of the content**	12	5	2	0.9
Verbal agreement and spelling	17	2	1	1.0
Adequacy of title and topic sizes	13	5	2	1.0
Adequate illustrations	16	3	1	1.0
Adequate number of pages	12	8	0	1.0
Adequate aesthetics	17	2	1	1.0

Source: Research data, 2020
* CVI = Content Validity Index ** One expert considered it inadequate

PhDs), combined with the knowledge of the target audience, were positive aspects, since different specialized knowledge within the theme addressed is relevant in validation studies of educational technologies[30,31]. In addition to the fact that a multidisciplinary approach can more appropriately contribute to COVID-19 coping and prevention strategies in the current scenario[32].

The analysis evidenced a high global CVI, both in the evaluation by the judges (0.99) and by the target audience (0.96), suggesting that it is a representative material in terms of appearance and content. The validation stage by the judges is essential to identify inconsistencies that may impair its content or understanding and favors greater methodological rigor in the construction of educational technologies[33].

Research studies carried out by nurses, validating booklets, despite not addressing the theme of COVID-19, have found CVI results similar to those found in this study and signal the validated capacity of technologies to contribute to health educational practices[25,29,32,33]. Studies devoted to show the experience on the production and dissemination of educational booklets, in the context of the COVID-19 pandemic, claim that this technology enables the expansion, dissemination and access to secure information, as well as contributing to health education strategies[34-37].

Regarding the appearance of the educational material in this research, which obtained a CVI of 1.0 for both the judges and the target audience, we can infer that there was recognition by the participants that the booklet is visually attractive, which

Table 3. Evaluation by the target audience regarding the booklet in terms of content and appearance. Divinópolis, MG, Brazil, 2020. N=16

Item evaluated	Totally adequate	Partially adequate	Inadequate	CVI*
Sequence of the content	16	0	0	1.0
Structure organization	16	0	0	1.0
Clarity of the phrases**	15	0	0	1.0
Clarity of the writing	16	0	0	1.0
Organization of the sections	16	0	0	1.0
Approach to subject matters necessary for cleaning and disinfecting toys	16	0	0	1.0
Relevance and adequacy of the illustrations	16	0	0	1.0
Pertinence of the illustrations complement the text	16	0	0	1.0
Ability of the booklet to generate interest and understanding of the content***	14	0	0	0.8
Ability of the booklet to motivate the reader until the end***	14	0	0	0.8
Ability of the booklet to promote attitude and reflection on the theme	16	0	0	1.0
Ability of the cover to draw the attention****	15	0	0	0.9
Ability of the booklet to motivate the reader until the end***	14	0	0	0.8
Ability of the booklet to promote attitude and reflection on the theme	16	0	0	1.0

Source: Research data, 2020
* CVI = Content Validity Index ** One participant was unable to answer *** Two participants were unable to answer **** One participant was unable to answer

can arouse interest in reading it. Using images is opportune for transforming textual information into visual language, facilitating the understanding of the subject matters treated; and it is necessary to recognize that, in educational materials, figures play an important role in communication, in this sense, their choices need to be assertive[27].

Data analysis indicated that, in relation to the characteristics that make the booklet a relevant material, the minimum agreed target goal was obtained. This fact confirms the importance of using this material in order to contribute to the promotion of health education in the school context, within which this material is proposed. Providing information and guidelines by means educational materials can be an important strategy to increase adherence to the preventive measures in relation to the new coronavirus[38].

The booklet was considered relevant in terms of approaching the stages that involve cleaning and disinfecting toys, as well as in relation to the information and guidelines incorporated by the instrument. It is necessary to recognize that, in the current global context of the COVID-19 pandemic, producing adequate, reliable and timely information, becomes even more relevant[38], especially since we are not experiencing only an epidemic, but also an infodemic[32]. Infodemics are characterized by an excess of pieces of information, some accurate and others not[39]. In this sense, safe, validated and evidence-based information must be considered one of the answers that can be given in a pandemic moment.

Even with a CVI over 0.8 for almost all the items evaluated, we incorporated most of the participants' suggestions as shown in the results (Chart 1). However, some suggestions by the judges were not fully accepted in the booklet such as, for example, including cleaning and disinfecting the toys available in the playground like slides, small houses and seesaws, among other toys such as bicycles and tricycles. Depending on their size, these toys require different cleaning and disinfection strategies, and would imply a specific booklet for them. Another suggestion would be to include guidance on cleaning and disinfecting toys with more than one type of material such as fabric, plastic and metal. In this case, as each material may require the use of different disinfectants,[12] cleaning and disinfection may be ineffective or damage the toy, thus partially meeting the suggestions; at the end of the booklet we include a tip on how to avoid using toys with more than one type of material, that park toys have specifics regarding their cleaning and disinfection, and that the material produced was not studied.

The items referring to the booklet's ability to generate interest and motivate reading until the end obtained a CVI at the agreement threshold. To enhance these aspects, it is recommended to use the booklet collectively, in training sessions and educational meetings, even if virtual, as interactivity favors the teaching-learning process[40] and, therefore, is believed to stimulate discussions and assimilation of these practices in the educational routine.

We must consider that the development of educational technologies requires a set of knowledge and procedures such as review of scientific evidence, valuation of professional experience, definition of the purpose of the material produced, selection of the target audience, type of material, themes, illustrations and

Chart 1. Suggestions and changes made to the booklet and the opinion of the judges and the target audience on the booklet.

Judges' suggestions	Change made
Enter Information	Greater detail on the hand hygiene technique with figure insertion (J1).
	Add other COVID-19 symptoms such as runny nose, sore throat, headache and anosmia, and diarrhea and red spots on the body can be present in children (J18).
	Introduce guidelines on what to do in case of the presence of COVID-19 signs and symptoms (J6).
	Detail the care measures with the use of masks by adults and children (J2).
Exchange of terms	For toys that will use alcohol as a disinfectant, introduce the following information: "Wait for this product to evaporate spontaneously" (J1).
	At the end, we introduced a "test your knowledge about the new coronavirus and the cleaning and disinfection of toys" in the form of questions, about the contents of the booklet (J1).
Change in appearance	We changed the word "effective" to "appropriate" (J9).
	The title: "Getting starting" was changed to "To Begin" (J19).
	The word "Alert" was changed to "Stay tuned" (J10).
	"Correct use of masks" was changed to "Correct use of the masks" (TA2)
	Change in the style/font of the letter of the titles of the pages of the booklet (J5).
	Avoid using capital letters (J2).
Unit of Meaning	**Opinion of the judges and target audience**
Appearance	Very well illustrated. (J4) I found it very creative and appealing, (TA1) It is very well illustrated (TA8).
Content and Clarity	The objectives are clear, texts easy to read; (TA5) Illustrative and easy to understand texts; (J5) Words that are easy to understand; (J5) I liked the content, the material was great (J8).
Relevance	I believe that these measures must be encouraged and carried out after the pandemic (J14). Interesting (TA5); Congratulations on the work and initiative (TA1, TA6, TA4, J1, J9, J14, J19); Excellent booklet, could be delivered to parents by the schools (TA8); I really liked the booklet (TA1, TA3); I loved the material, I hope it will be used in my children's schools (J1); Very adequate and necessary (J2); This material can also be directed to health professionals who work with children in playrooms, for example (J19).
Applicability to the context of the Pandemic	We will also use it as a study document in school planning. (TA3); My assessment of the material is that it manages to meet the needs of the schools. (TA5); It will even help in elaborating the checklist (protocol); (TA3) Congratulations on the applicability of the project, in the face of the COVID-19 pandemic (J9). The topic is extremely important, especially at the time we are living (J14). Informative material that will allow for great outreach and daily care when playing/learning/doing, since playing is part of learning and is an occupation activity for the child. (J18).

Source: Research data, 2020
* J: Coding for the Judges followed by a number (1 to 20) assigned to the questionnaire that they answered. ** TA: Coding for the target audience, followed by the number (1 to 16) assigned to the questionnaire answered by each of its members.

content of accessible language[41]. During the booklet elaboration process, these dimensions were considered as what resulted, as can be identified in the results presented, in good quality material and with validation by the participants.

This process signals that the booklet constitutes an educational technology that may support health education practices, which is confirmed by other studies[19,42,43] devoted to producing similar materials. A number of research studies have shown that educational technologies are important devices for assessing teaching and learning processes in different areas of continuing education[40,42].

Educational technology as a tool that can be used within the health education process assists in the mediation of activities performed by the nurses, during the sharing of information; however, it requires the planning of actions that meet the needs of the target audience for which the technology is intended[40]. In this sense, we infer that the material produced in this study must be used by nurses, based on contextualized planning for the

different school realities that are found in the current pandemic scenario of COVID-19.

CONCLUSION AND IMPLICATIONS FOR THE PRACTICE

The educational booklet was validated for its content and appearance, and can be considered relevant to contribute to educational practices in nursery schools, in the current context of the COVID-19 pandemic.

We concluded that the results of this research generated an educational technology useful for schools, daycare centers and also for public health, considering that, in the current pandemic context, there is lack of consistent evidence on the subject matter and a need to produce reliable and validated educational materials. Thus, we infer that education professionals and nurses will be able to use this technology as an instrument of education in health to prevent the spread of COVID-19 in the school environment.

The booklet may be used by the target audience as a support material in health education processes with the school community and may also be consulted by the professionals responsible for the hygiene of toys, in the development of the cleaning and disinfection routine of these objects. It may even be adopted by nurses in the development of health education practices aimed at school professionals.

It is opportune to consider the possibility of the material produced in this study to contribute to the development of educational technologies in other scenarios of child care such as hospitals and playrooms, favoring the performance of playmates.

This study presents as a limitation the absence of a previous stage, with field research, to investigate with the school community what the needs of this school are in relation to the prevention strategies for the new coronavirus involving toys for pedagogical use. We also recognize that, although validated by the target audience, this educational material needs to be used in future studies, in schools, to understand in detail the applicability and effectiveness of this educational technology.

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