

# Construction of educational technologies in cardiopulmonary resuscitation teaching for elementary school educators

**RESUMO** | Objetivo: relatar a experiência sobre a produção e a divulgação de uma tecnologia, em forma de cartilha educativa, para orientar educadores que atuam no ensino fundamental, sobre as ações de primeiros socorros que devem ser tomadas frente à uma parada cardiorrespiratória. Método: trata-se de um estudo descritivo, tipo relato de experiência. O desenvolvimento do projeto ocorreu no primeiro semestre de 2021, respeitando as etapas metodológicas sugeridas por Sabino para a construção de cartilhas educativas. Resultado: desenvolveu-se uma cartilha educativa intitulada “Suporte Básico de Vida para Educadores do Ensino Fundamental”, contendo 28 páginas, com dimensão de 297x210mm, editoradas com auxílio do software Adobe InDesign. Conclusão: a cartilha educativa pode tornar-se uma ferramenta válida a ser utilizada pelos educadores, com o objetivo de informar, reforçar conhecimentos e formar multiplicadores para reanimação cardiorrespiratória, reduzindo a morbimortalidade por causas externas na infância e na adolescência.

**Descritores:** Enfermagem; Tecnologia Educativa; Primeiros Socorros; Suporte Básico de Vida; Educação em Saúde.

**ABSTRACT** | Objective: to report the experience on the production and dissemination of a technology, in the form of an educational booklet, to guide educators who work in elementary school, on the first aid actions that must be taken in the event of a cardiorespiratory arrest. Method: this is a descriptive, experience report type study. The development of the project took place in the first half of 2021, respecting the methodological steps suggested by Sabino for the construction of educational booklets. Result: an educational booklet entitled “Basic Life Support for Elementary School Educators” was developed, containing 28 pages, measuring 297x210mm, edited with the help of Adobe InDesign software. Conclusion: the educational booklet can become a valid tool to be used by educators, with the objective of informing, reinforcing knowledge and training multipliers for cardiorespiratory resuscitation, reducing morbidity and mortality from external causes in childhood and adolescence.

**Keywords:** Nursing; Educational technology; First aid; Basic life support; Health education.

**RESUMEN** | Objetivo: relatar la experiencia sobre la producción y difusión de una tecnología, en forma de cartilla educativa, para orientar a los educadores que actúan en la enseñanza básica, sobre las acciones de primeros auxilios que se deben tomar en caso de parada cardiorrespiratoria. Método: se trata de un estudio descriptivo, tipo relato de experiencia. El desarrollo del proyecto se dio en el primer semestre de 2021, respetando los pasos metodológicos sugeridos por Sabino para la construcción de cartillas educativas. Resultado: se elaboró un cuadernillo educativo titulado “Soporte Vital Básico para Educadores de Enseñanza Básica”, de 28 páginas, de 297x210 mm, editado con la ayuda del software Adobe InDesign. Conclusión: la cartilla educativa puede convertirse en una herramienta válida para ser utilizada por los educadores, con el objetivo de informar, reforzar conocimientos y multiplicadores de formación para la reanimación cardiorrespiratoria, reduciendo la morbimortalidad por causas externas en la infancia y la adolescencia.

**Palabras claves:** Enfermería; Tecnología educacional; Soporte básico de la vida; Educación para la salud.

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## INTRODUCTION

One of the assumptions of the school is the promotion of health through the construction of healthy environments. School children are naturally curious, restless, adventurous and are learning to live with frustrations and accomplishments. These characteristics associated with other factors, mainly environmental ones, can result in situations that require first aid actions.<sup>1,2</sup>

Cardiopulmonary arrest (CPA) is one of the emergencies with the greatest potential for seriousness. During cardiac arrest, immediate cardiopul-

monary resuscitation (CPR) is essential to increase survival rates and reduce victims' sequelae.<sup>1</sup> In the school age group, the incidence is higher among adolescents. Trauma (intentional or not) is the main cause of this event in an out-of-hospital environment for this group.<sup>2,3</sup>

One of the biggest challenges is to expand access to CPR teaching for educators, establishing processes for the continuous improvement of its quality in basic life support (BLS). In addition, the professionals who work at the school can be important multipliers in the community and act as agents of change, transforming the school space into a safe environment permeated by accident prevention and prepared to act when necessary, applying the appropriate procedures.

Recent updates from the American Heart Association (AHA) point out that education is a key element in improving survival outcomes after cardiac arrest 1, that is, in fact, the use of light technologies, such as the booklet, has assumed an important role in the health education process, favoring the construction and reconstruction of knowledge between lay people and health professionals.<sup>4</sup> In this context, educational booklets stand out as a strategy to bring the facts of the world of science closer to the lay public, through different strategies, so that even if the reader has little knowledge, he can understand and apply in his daily life what is included in the material.<sup>5</sup>

The following aspects should be considered when preparing a booklet: adequacy to the target audience; clear and objective language; light and attractive look; and reliability of the information, since they are informative and educational materials on the most diverse subjects.<sup>6</sup> These materials must be built with a vocabulary consistent with the target audience, dynamic format and easy to understand, so that the reader has little or no difficulty in un-

derstanding the content covered. The educational booklets allow the reader a subsequent visit to the content, being able to reinforce the oral information of a practical training, serving as a guide for guidance in cases of doubts and assisting in everyday decision-making.<sup>4</sup>

The AHA points out in its documents that self-directed or instructor-facilitated resuscitation training has better results when supported by educational technologies with different instructional design features.<sup>1</sup> Educators, as well as health professionals, have responsibilities for the comprehensive care of children and adolescents.<sup>7</sup> The construction of interdisciplinary dialogue between these groups is necessary for the dissemination of correct and accessible information regarding emergencies that may occur in the school space and its surroundings.

The present work presents the experience resulting from the course conclusion work of two Nursing students, who envisaged the construction of this educational technology after the experiences in assisted practices of the Nursing Discipline in Child and Adolescent Health. Seeking a perspective of articulation between teaching and extension, the authors proposed the development of educational material for guidance on BLS.

The process of elaborating the educational booklet was based on the principles of educational-dialogical practice applied to health pedagogy. This educational practice offers subsidies for students and educators to be agents of transformation.<sup>4</sup>

Therefore, this study aimed to report the experience on the production and dissemination of a technology, in the form of an educational booklet, to guide educators who work in elementary school about the first aid actions that must be taken in the face of a CPA.

#### METHOD

This is a descriptive, experience report type study. The development of the project took place in the first half of 2021, respecting the methodological steps suggested by Sabino<sup>6</sup> for the construction of educational booklets.

The first step was to define the theme. At this point, it was important to delimit the theme of the booklet in order to avoid content and information overload. The second stage involved the definition of the topics that made up the booklet. The authors held a meeting and used the dynamics of brainstorming to share ideas on the topic. Soon after, the mind mapping technique was applied during a new round of brainstorming. Three terms were chosen that summarized the main theme and the group listed related words and wrote them on a large sheet, always connecting them with a line. After exhausting the ideas for the three original terms, the same was done for the derived words, continuing until the entire space on the sheet was filled.

The third step was to carry out an extensive bibliographic research to ensure the reliability of the information. This bibliographic survey for the construction of the material took place mostly in the AHA Guidelines 1, of the Brazilian Society of Cardiology 8 and the Brazilian Society of Pediatrics 9, because they are reliable and reliable sources with current data on the subject. After the survey, the data were organized in linearity to later be added to the final file of the booklet. The language was also adapted so that it was accessible both to educators and to the entire community that came into contact with the material.

After the bibliographic survey and the organization of the data found, the process of selecting the illustrations that would compose the material began, taken from the Freepik website, which provides illustrations of various themes with a free license to use, as well as the Canva® website, where the

design of the booklet was prepared.

The next step, fourth, was the elaboration of the script, which included the details of each page of the booklet, the illustrations, the textual content, the language and the colors used in the layout of the material. In the fifth stage, the booklet was developed. At that moment, there was the collaboration of other professionals in the area of publishing and graphic design.

The sixth stage included the printing of the pilot to enable the conceptual review and the Portuguese language in the material, as well as a review of the relevance of the illustrations/images to the content. 6 And also the review of technical content by emergency experts. The last step, the seventh, was the final layout and subsequent distribution in electronic format.

## RESULTS

An educational booklet entitled “Basic Life Support for Elementary School Educators” was developed, containing 28 pages, measuring 297x210mm, edited with the help of Adobe InDesign software, which is an advanced book and booklet diagramming tool. At first, the authors used electronic distribution, via the internet, in order to reduce printing costs.

There are perspectives of graphic printing so that the booklets can serve as pedagogical support for simulated CPR training in schools. In this way, the material was formatted in a number of pages multiple of four so that it can be used on the front and back of the sheets, in its future printed version.

All pages were numbered sequentially with numbering in Arabic numerals from the first textual page, in the upper margin. Most of the texts in the booklet are predominantly active voice sentences, simulating a conversation with the reader.

Short sentences were used in technical, accessible and easy-to-read lan-

guage to facilitate understanding by the target audience. Time News Roman and Georgia fonts with sizes 10, 12, 14, 26 were used. The color black was used due to the light background of the booklet. In some sequences of the text, the size of the keywords was increased to highlight the main ideas. In addition, the size was increased and bold markers in blue or red were used. The font headings that start the sections have also been increased by two points in relation to the texts contained in the pages. 5

Colored illustrations were chosen in the construction of the booklet in order to draw the reader's attention and, mainly, add information to the text (Figure 1). The booklet was divided into sections, which were organized in order to promote linearity and deepening by the reader about the content covered. 5 These sections were as follows: Authors; Summary; Presentation; First Aid: Fundamental Concepts; What do I really do in first aid situations; Basic support of life; Chain of survival and its links; When help arrives, what happens?; Why is it important for the

educator to learn CPR?; BLS algorithm for schools; and References.

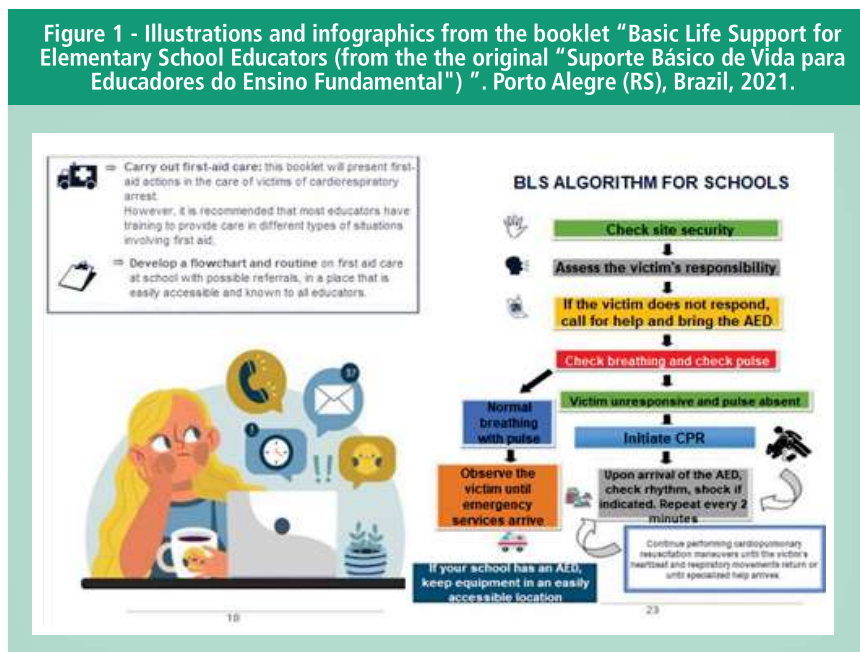
In addition, a QR Code was made available in the booklet directing the reader to an explanatory video on the functioning of the Automatic External Defibrillator (AED). The QR Code is a barcode that can be scanned by any camera present on a cell phone. This code can be transformed into text, telephone numbers, georeferenced location, internet pages, among others (Figure 2).

In the past, specific applications for reading the codes were necessary, which is no longer the case, most of the time, the cell phone camera is able to read a QR Code, just by pointing the cell phone.

Figure 3 shows the diagramming of the booklet with its respective elements.

## DISCUSSION

It should be noted that the recorded mortality of Brazilian children and adolescents between 1999 and 2019 was 1,767,616 deaths. The main cau-



Fonte: Maximiliano LP, Quadros E, Santos MN. Suporte básico de vida para educadores do ensino fundamental Porto Alegre: Moriá, 2021.

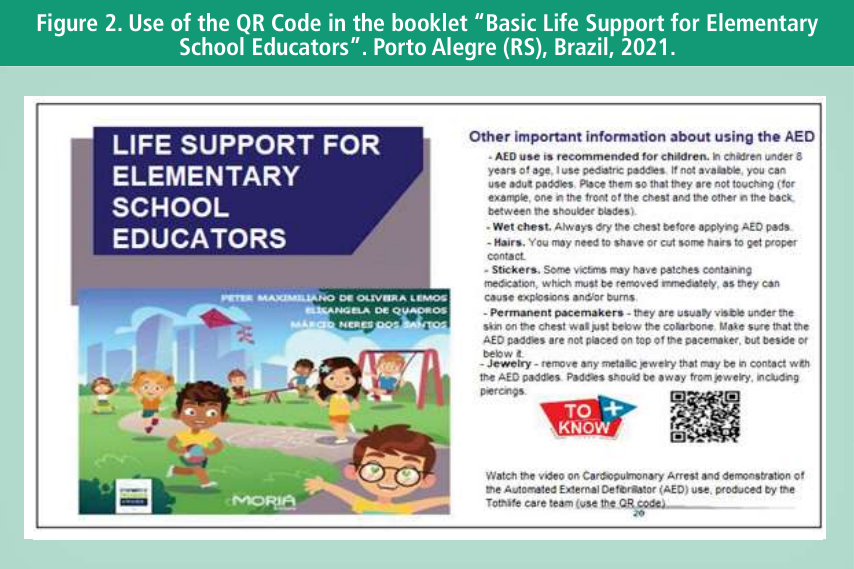


ses of death were: conditions related to the perinatal period – 560.8 thousand (32%), followed by external causes – 439.8 thousand (25%).<sup>10</sup> External causes account for a quarter of the causes of pediatric hospitalizations in the last decade, the main reason for these numbers being domestic or school accidents.<sup>10</sup> As a result, there is a need for education for prevention and action in first aid actions with elementary school educators.

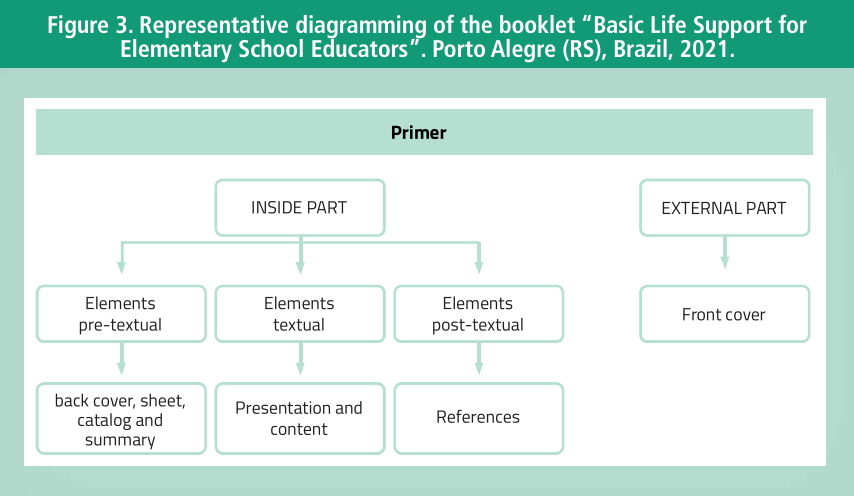
Another situation that highlighted the topic, which occurred in September 2017, was the death of 10-year-old Lucas Begalli Zamora, after choking and progressing to cardiorespiratory arrest during a school trip. This fact spurred the creation of Law nº 13,722 (known as the Lucas Law), of October 4th, 2018, which makes training in basic first aid mandatory for teachers and employees of public and private basic education establishments and children's recreation establishments.<sup>11</sup>

BLS measures represent a set of basic skills for the execution of procedures aimed at ensuring the maintenance of life in urgent and emergency situations within the principles of non-maleficence, that is, not expose to unnecessary risks and damage the one who needs help. The training of educators is one of the fundamental pillars for reducing morbidity and mortality in pre-hospital settings. First aid should not only focus on the care of apparent physical injuries or possible disease in its acute form, but in the integrality of the initial care, which includes psychological support, the reduction of pain and suffering, in addition to prevention and health promotion actions.<sup>3</sup>

In Brazil, some professional categories are required to provide first aid due to their training or professional activity, such as: firefighters, police officers, health professionals, flight attendants, among others. Educators are not among these categories, however, Brazilian legislation contains some ele-



Source: Maximiliano LP, Quadros E, Santos MN. Basic life support for elementary school educators Porto Alegre: Moriá, 2021.



Source: Authors, 2021.

ments regarding the non-provision of help to those who are unable to help themselves or the non-communication of the event to the public authority that can do so, characterizing these actions as failure to provide assistance. Failure to provide assistance is one of the crimes provided for in the Brazilian Penal Code, in its Article 135.<sup>3,12</sup>

It is important to think of the school space as a community, multi-utilitarian place, in which there is a circulation of

many people during its opening hours and susceptible to the occurrence of a PCR. In this sense, it is necessary to reflect on urgent and emergency situations, as they do not choose a specific date or place, and the arrival of health professionals varies with the time of activation and displacement to the scene. Thus, first aid actions need to be initiated by people present at the scene and who witness the situation.<sup>13,14</sup>

Empowering educators is necessary



for them to take the lead in first aid actions, especially in environments with potential risk, such as schools and day care centers.<sup>14</sup> Typically, schools do not have trained health professionals (nurses, doctors or nursing technicians) on their premises as permanent staff. School educators are the main providers of care for children at school in urgent and emergency situations.<sup>15</sup>

A study conducted in schools in the United States of North America (USA) reported poor or incorrect practices associated with injury, illness and first aid management, mainly related to CPA, among school teachers.<sup>16</sup> In Brazil, the result of a study in elementary schools showed that few teachers received training in first aid. Another important piece of information from this study points out that schools did not have any training plan for their educators and few were equipped with first-aid kits in order to adequately respond to these demands.<sup>14</sup>

The AHA, in its guidelines, is based on scientific evidence produced globally to establish the protocols to be used during CPR safely in any environment.<sup>1</sup> These protocols indicate standardized behaviors to be taken by rescuers in the face of a CPA. The evidence presented in the update of the AHA guidelines shows that the layperson, when performing maneuvers with chest compression on a victim of cardiac arrest, increases the chance of survival of the victim until the arrival of trained professionals.<sup>1,8,9</sup>

The literature demonstrates that in addition to the use of deliberate practice and learning for mastery during BLS training, the use of other educational technologies can improve the acquisition of skills.<sup>1,9</sup> The use of booklets, built from scientific evidence, can be an effective strategy to facilitate the understanding of information by the target audience.<sup>14,16</sup>

Educational technologies are considered as “a body of knowledge enri-

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ched by human action, and it is not just about the construction and use of artifacts or equipment”.<sup>17,18</sup> These technologies are support tools for measuring teaching and learning processes between educators and students in different education processes.<sup>17</sup>

In schools, using the booklet, in conjunction with reinforcement training (i.e., brief retraining sessions), can help with retention of CPR skills. Often, the materials distributed fail to achieve their goals, bringing frustrating results, mainly due to the divergence between what is intended to inform and what the target audience considers really important.<sup>17,18</sup> In this sense, the construction of the booklet also had the need to choose illustrations that could be linked to the text to give clarity and linearity to the acquisition of knowledge by the readers.<sup>16</sup>

Regarding the booklet presented in this case report, we also tried to delimit a large topic and keep a small number of topics, since the variety of topics and countless topics can lead the reader not to remember or not connect the other subjects after the first.<sup>5</sup> The main topics were related to the links in the chain of survival, as they represent the sequence of procedures developed to guide and save the lives of people who have suffered a CPA. The AHA, through its guidelines, confirms that the chain of survival is a way to increase efficiency and effectiveness in helping the victim.<sup>1</sup>

In addition, the booklet emphasized the use of AEDs, as evidence shows that the use of AEDs during out-of-hospital cardiac arrest is associated with survival, as well as the main objective is not to aggravate existing injuries or generate iatrogenic events. A rapid BLS associated with early defibrillation provides up to a 60% chance of survival for the victim.<sup>19,20,21</sup>

The AED recognizes ventricular fibrillation, as well as other pulseless ventricular tachycardias, ie, shockable rhythms, and guides operators throu-

gh the defibrillation process. When properly connected to a patient who is unconscious, not breathing, or has no pulse, this equipment analyzes the patient's heart rate, provides audio instructional guidance, determines if a shock situation exists and, if appropriate, automatically arms the shock trigger button. The defibrillation shock is delivered through the two defibrillator pads with self-adhesive, low-impedance electrodes with existing gel.<sup>3,14</sup>

In the booklet, the importance of the school obtaining an AED is reinforced. It is also informed that the equipment is intuitive and easy to operate and, among its many advantages, it can be handled by laypeople, that is, it is not exclusive to be handled by health-care professionals.<sup>19,20,21</sup> The use of the AED still brings many doubts to the lay public, especially regarding the administration of shock.<sup>14,5,16</sup> In the material produced, it was emphasized that this analysis is performed by the automated intelligent system itself and, if chest compression or the return of this maneuver is necessary, the system will guide the rescuer.

In Brazil, at the federal level, Bill No. 4050/04.22 is currently awaiting the opinion of the Federal Senate. This bill determines that AEDs are available in places with large circulation of people and specific vehicles, such as ambulances and rescue vehicles, police and firefighters. However, it is common to find other legislation with the same purpose, but introduced by states

or municipalities. In most cases, they all have the same objective, which is to give PCR victims more chances of survival. All legislation on DEA, in the different governmental spheres, aims to guarantee the presence of equipment in places that receive a certain number of people circulating daily, such as schools, clubs and day care centers.

However, it is worth emphasizing that quality CPR is not limited to the proper use of the AED. Studies have shown that trained laypeople are able to provide more qualified care by developing greater skill in mechanical maneuvers, such as effective chest compressions.<sup>19,20,21</sup> The use of educational technologies can enhance the knowledge, skills and abilities necessary for the integral development of urgent and emergency care. Educational booklets can be used to reinforce the knowledge of educators.

In this context, a colored booklet was preferred, as they are more effective in transmitting the message, in contrast to monochromatic materials.<sup>5</sup> This item helped so that the information was not dispersed, because when conveyed in an inappropriate format and incompatible with the needs of the population, it is not effective.

The use of these educational technologies in health education can be considered as a complementary resource available to educators, helping them to make decisions in the face of emergency situations for children.<sup>16</sup> Booklets, as well as other educational

technologies, must go beyond instrumentalization for first aid care. Educators must be prepared to control the risks of the occurrence (prevention) and guide the correct way to activate a specialized service, such as ambulances and health professionals.

## CONCLUSION

Children spend part of the day in schools and are at a higher risk of accidents and injuries due to involvement in sports and other extracurricular activities and therefore need first aid more often than adults. The importance of developing new resources and strategies for educational practices in first aid situations, fundamentally CPA, is highlighted. The educational booklet can become a valid tool to be used by educators, with the objective of informing, reinforcing knowledge and training multipliers for CPR, reducing morbidity and mortality from external causes in childhood and adolescence.

The construction of this educational booklet aimed at elementary school educators provided an opportunity to approach and deepen the proposed theme, enabling the construction of a relevant experience for students. In this way, future professionals will be able to expand their knowledge through other tools for the structuring of pedagogical teaching material for education and health promotion.

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