



Analysis of Effect and Development of Instructional Framework About First Aid for Kindergarten Students

Duygu İleritürk¹ · Atıf Bayramoğlu² · Emine Türkeç³ · Nurdan Kımırtı³ · Yunus Emre Özden³

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Abstract

First aid has a crucial role in preserving human lives. The prompt administration of first aid increases the likelihood of its efficacy. Hence, the implementation of first aid procedures by children in settings exclusively occupied by children and adults can yield significant advantages. The objective of this study was to develop an instructional design that would facilitate the provision of first aid training to kindergarten students. The researchers implemented the instructional design they had designed in the kindergarten setting for the intended goal. The study employed the design-based research method, utilizing Gagne's Nine Events of Instruction model that was adapted from Gagne, Briggs, and Wager's model (1992). According to the results of the study, it can be concluded that a 10-week practice-oriented instructional design used for 18 kindergarten children have demonstrated efficacy in acquiring knowledge related to first aid and how it is done. The results of the study show that the kindergarten children could know what the emergency situation is and what they could do when they see it.

Keywords Design-based research · First aid · Instructional design · Syllabus

Introduction

Although there is limited evidence regarding prehistoric humans, it is likely that they faced situations where they needed to provide first aid. It is believed that they developed techniques to stop bleeding, stabilize broken bones, and determine the toxicity of certain plants. Estimates suggest that prehistoric societies utilized natural plants as medicinal

agents for treating wounds. In 1878, the terms “first treatment” and “national aid” were merged to form the term “first aid.” The United Kingdom established a unique training program to educate civilian ambulance crews in railway, mining, and police activities. In modern society, ambulances are the primary means of delivering emergency medical aid. The team consists of individuals with first aid expertise and healthcare professionals who have undergone additional specialized training, such as emergency medical technicians and paramedics (Hecht & Foster, 2015). These specialized teams ensure a swift and effective response on-site, significantly improving survival rates. Immediate medical assistance is available at the scene thanks to trained healthcare professionals. Nearby individuals should act quickly to assist. In the late 19th century, researchers around the world studied the concept of first aid and proper techniques for its application, particularly focusing on individuals who had experienced trauma. Scholars like Parker (1887), Butler (1892), Smart (1893), Hedley (1894), Pilcher (1896), Deanesly (1897), Matthews (1898), and Osborn (1898) contributed to this field.

First aid refers to the immediate medical help given in response to an unexpected illness or injury. The main objective is to preserve life, minimize harm, and alleviate pain. Cardiovascular diseases are the leading cause of death globally, but trauma is the primary cause of mortality

✉ Duygu İleritürk
duygu.birbiri@atauni.edu.tr

Atıf Bayramoğlu
atifbay@gmail.com

Emine Türkeç
turkec@bels.bilkent.edu.tr

Nurdan Kımırtı
nurdank@bels.bilkent.edu.tr

Yunus Emre Özden
ozden@bels.bilkent.edu.tr

¹ Educational Sciences Department, Ataturk University, Erzurum, Turkey

² Medicine Faculty, Alanya Alaattin Keykubat University, Alanya, Turkey

³ Bilkent Erzurum Laboratory School, Erzurum, Turkey

in the economically active age group of 15–49 (Yildirim et al., 2016). Hemorrhaging is the leading cause of death in individuals who have experienced trauma. Stroke is commonly acknowledged as the leading cause of disability. In such instances, prompt first aid can significantly enhance survival rates. For example, providing first aid following a traffic collision is crucial to preventing hemorrhage. Efficient and appropriate initial medical care can significantly improve the prognosis in these cases (Davis et al., 2014; Galvani et al., 2020; Sutton et al., 2020; Travers et al., 2015).

Timely first aid administration offers significant benefits. Delays in providing first aid can reduce its effectiveness, making prompt administration outside hospital settings crucial. The profession of the first aider, whether a healthcare professional or not, is irrelevant. Any individual with training in first aid can deliver assistance. It is vital to provide first aid promptly and in accordance with established guidelines to save lives and minimize injuries. Proficiency in first aid skills is essential. These skills include:

- Developing observation skills to assess the situation and make informed decisions.
- Setting the right priorities for the injured person.
- Knowing the limits of one's authority and responsibility.
- The ability to organize quickly when professional help is needed.

The European Resuscitation Council (ERC) released the first aid manual in 2021, which outlines the core concepts of first aid (<https://www.sciencedirect.com/science/article/pii/S0300957221000666>). First aid protocols should be based on the most reliable and well-supported research findings. This highlights the necessity of tailoring first aid manuals to the cultural and demographic characteristics of each community. First aid training must be provided to every segment of society. Efforts should be made to improve individuals' knowledge and skills in first aid and promote societal awareness.

In countries like Turkey, integrating first aid training into school curricula can help spread awareness. The level of first aid knowledge among adults in Turkey is below optimal levels (Kızıl et al., 2018; Temel et al., 2018). Recent adult-focused programs have only started in recent years and need to be expanded. In emergency situations, individuals often resort to traditional methods, such as using toothpaste for burns or coffee for bleeding, which are not scientifically supported and can lead to serious health problems. Promoting scientifically-based first aid training is crucial for improving public health. Abelairas-Gomez et al. (2020) found that most teachers and parents in their study did not have the correct first aid knowledge, highlighting the need for first aid education. Tse et al. (2023) and Vermonden et al. (2023) argue that first aid should be mandatory in school curricula, as

many teachers and children do not know how to effectively handle emergencies. Studies indicate that mandatory first aid education could increase survival rates over time. Khanam and Bausamy (2021) concluded that first aid programs significantly improve schoolchildren's knowledge, attitudes, and practices. While first aid education includes theoretical knowledge, practical training is essential for maximizing its impact. The European Resuscitation Council's 2021 first aid guide suggests adapting first aid training for young children through visuals, stories, and interactive methods. The Kids Save Life program teaches children first aid skills, focusing on the "check, call, compress" method, and encourages them to share this knowledge with their families to increase community awareness.

Numerous studies have evaluated the efficacy of "universal first aid training" (Buck et al., 2018; Güler et al., 1994). Researchers have assessed first aid knowledge and awareness among various demographic groups. These studies show that first aid awareness is generally insufficient across different societal segments. Studies conducted on groups such as primary and secondary school students (Bölükbaş et al., 2007; Campbell, 2012; Sosada et al., 2002; Uray et al., 2003) reveal significant knowledge and skill deficiencies, especially in groups outside education and healthcare professions. Many individuals in these groups lack confidence, making them feel unprepared. As a result, research advocates for optional first aid education in primary and secondary schools (Bakke et al., 2017; Banfai et al., 2017; Bollig et al., 2009; De Buck et al., 2015; Rekleiti et al., 2013; Wilks & Pendergast, 2017). Some studies suggest mandatory first aid training (Campbell, 2012; De Buck et al., 2015; Eisenburger & Safar, 1999; Foster, 2015; Nuernberger et al., 2006; Pearce, 2015). Empirical studies have explored the effectiveness of first aid education, particularly for kindergarten and primary school students (Bollig et al., 2011; Lee & Kim, 2010; Lubrano et al., 2009; Reveruzzi et al., 2016). Research shows that children who provide first aid in emergencies can have a significant impact. Teaching young children how to make informed decisions and take action in emergencies is vital for public health. Therefore, with this impact, Gagne's Nine Events Instruction model was chosen for the study.

Gagne's Nine Events of Instruction model is a widely used approach for effective instructional design and was specifically chosen for this study. Because the model aims to meticulously plan every stage in the education process and present information to students effectively. In an educational design for 5- and 6-year-old children, structured guidance is needed to capture attention, ensure understanding, and develop skills. Gagne's model provides a suitable framework for achieving these goals. First, the first phase of the model, which is focused on attracting attention, is a critical step for students in younger age groups. Capturing the attention of 5–6-year-old children

is a cornerstone of the educational process, and the most effective way to initiate education for this age group is to arouse their interest by using fun, visual, or story-based elements. This stage of Gagne provides tools to enable students to actively participate in the educational process.

The next stages support the transfer of information and the process of students remembering this information. Children aged 5 and 6 are generally better able to grasp concrete materials. While teaching children in this age group a practical skill such as first aid, it is important to concretize the information learned through activities such as visual tools, animations, and games. This structure in Gagne's model makes it easier for children to acquire information and ensures that what is learned is remembered. Moreover, the nine stages offered by the model allow structuring the teaching process step by step and ensuring that each stage effectively supports the next. This structure helps children learn skills such as first aid in order. Students complete each step in a specific order, ensuring that the learning process is orderly and efficient.

Gagne's model is also effective in both providing students with knowledge and showing them how to apply that knowledge. The "feedback" and "application of learned knowledge" phases of the model enable children to immediately reinforce the information they have learned and make corrections when necessary. Especially in an education where vital skills such as first aid are taught to children, such practical feedback contributes to the acceleration of learning. This ensures that children get immediate feedback when they do something right or wrong and have the information they need to take the next step.

As a result, Gagne's Nine Teaching Events Model offers an interactive and structured teaching process appropriate to the developmental characteristics of children. This model ensures that each phase is carefully planned to make first aid training more effective. Handling each step in a certain order during the education process reinforces 5–6 year old children's learning of this important skill and increases their motivation for learning. Therefore, Gagne's model provides a suitable framework when teaching first aid skills to younger age groups in this study. In this manner, based on Gagne's Nine Events instructional model, it is aimed to develop an educational framework for first aid instruction specifically designed for kindergarten children and assess its effectiveness. The primary research question is:

What are the perspectives of kindergarten children regarding the impact of first aid training tailored to their age group?

Method

Design

The study used a design-based research methodology. Research conducted on educational designs that are based on established theories led to the development of design-based research (DBR) (Cobb et al., 2003; Collins et al., 2004). The purpose of developing DBR was to improve the synergy between design, theory, and practice. Wang and Hannafin (2005) proposed the concept of design-based research. This methodology entails a series of iterative cycles, where analysis, design, development, and implementation are carried out collaboratively with academics and participants in a real-world implementation context. Educational research was a systematic inquiry conducted to improve educational methods and develop design ideas and theories that are appropriate for specific situations. Kuzu et al. (2011) have defined this study approach as adaptable. The current study focused on creating a 10-week educational plan for teaching first aid to kindergarten students.

Sample

The study's sample consisted of 18 kindergarten pupils who were enrolled in a private school consisting of six females and twelve males, all of whom were between the ages of 5 and 6. There were two teachers working as kindergarten teachers at the same educational institution. By using a convenience sampling technique, we established the sample. Their parents had higher educational qualifications, and their socioeconomic status surpassed the reflected in the Turkish gross national product.

Data Collection Instruments

In order to address the issue of lack of literacy among kindergarten children, we employed the role-playing technique to simulate a first aid scenario. The current study utilized a range of circumstances to investigate and record the initial medical procedures chosen by professionals in reaction to specific case studies. Two separate observers diligently kept unorganized observation records within the school environment to analyze children's preferences for first aid. In addition, the research utilized many data collection instruments, such as a semi-structured interview form and reflective diaries from both participating teachers and observers.

Process

The study employed the instructional design process called as Gagne's Nine Events of Instruction adapted from Gagne, Briggs, and Wager's model (1992). The current methodology consisted of a total of nine main stages. The following sequential actions are numbered below.

1. *Gain Attention of the Students:* To start, we brought together different people to talk about when and how first aid might be needed. We had a meeting with the school principal, the teacher who helped with the early years, the school nurse, and even the kindergarten kids. We asked them questions to understand when someone might need first aid and what everyone already knows about it. From this talk, we decided to create a 10-week program to teach everyone how to help in an emergency.
2. *Inform Students of the Objectives:* By the end of the first aid program, all the kindergarten children would know how to:
 - Recognize when someone needs help, whether it's at school or at home.
 - Learn how to call for help by using the phone and telling the right people what happened.
 - Use basic first aid to help someone when needed.
 - Ask nearby adults for help if they need it.
3. *Stimulate recall for prior learning:* Before helping someone, it was very important to make sure the place is safe. We always looked around to see if anything could be dangerous to us or the person needing help. If everything had looked safe, the first thing we did would be call for help. We called the emergency number (112) and told them what happened. The student should know how to act fast but also carefully—getting help quickly was key, but we didn't want to rush without thinking.
4. *Present the content:* When someone was hurt or sick, we needed to know what to do to help them feel better and stay safe. The student would learn how to act in ways that kept the person comfortable and calm. It was important to be gentle with someone who was hurt, and always stayed kind when helping.
5. *Provide learning guidance:* We taught students how to talk to someone who was hurt in a way that helped them feel calm. It was important to be honest but not made things worse by saying things that weren't true. If someone had hurt badly, we could have not moved them, unless it was absolutely necessary to keep them safe. This rule helped keep the person safe while waiting for professional help.
6. *Elicit performance:* The children would learn how to recognize when someone was seriously hurt and how to help them right away, such as with burns or sprains. Our goal was for kindergarten teachers, school nurses, and the children themselves to know exactly what to do in emergencies.
7. *Provide feedback:* It was important for anyone helping to stay calm during an emergency. In emergencies, we might often feel nervous or scared, but we have to focus on staying safe and helping others. The person helping should know how to stay calm, think clearly, and call for help right away. In this part of the program, we taught the students that it was okay to feel nervous, but the best thing they could do was to stay calm and act confidently.
8. *Assess performance:* We created a 10-week course to teach children first aid. The course was adapted so it was just right for kindergarten students. The teachers who helped completed special first aid training and certification. Throughout the course, the children were observed to make sure they were learning the right skills. The purpose of this performance was to identify potential risks and hazards that may pose a threat to both the responder and the patient. After identifying these dangers, it was imperative to implement suitable measures to guarantee the safety of the area before proceeding with any additional actions. The student immediately called the emergency health care hotline, dialing 112, to ask for help, clearly explaining their predicament and specifically requesting assistance.
9. *Enhance retention and transfer:* After each lesson and practice, we checked in with both the students and teachers to see how well they were doing. The researchers asked the children and teachers what they learned and what they thought about the lessons. We wanted to make sure everyone remembers what they learned and could use it in real situations. After the training, we asked the students if they felt ready to help someone in need and made sure they had all the right knowledge and skills.

Data Analysis

The study used qualitative data analysis approaches. Within the current framework, we utilized descriptive analysis and content analysis to scrutinize the data collected during the inquiry. During the data gathering phase, we performed macro-level analysis. In the macro-level phase, we made efforts to access all accessible data sources and utilized various data collection tools to gather information pertaining to the study procedure and participants. Following the acquisition of data, we performed detailed analysis at a small-scale level. During the micro-level analysis phase, we organized the data we obtained into codes, categories, and topics. Qualitative data analysis encompassed the subsequent stages:

- **Data Transcription:** The researchers transcribed the video recordings, reflection diaries, and interviewee records separately, ensuring that the original information was preserved without any changes. During the following stage, the researchers conducted a thorough and independent examination and evaluation of each record. The raw data was given to an expert in evaluation processes, who analyzed the data records to evaluate their coherence. Throughout this process, the data remained unchanged.
- The researchers devised a classification system to scrutinize the data obtained from interviews and observations, ensuring its alignment with the study's aims. The obtained codes were carefully classified based on their commonalities within the same category, which facilitated the formation of theme clusters.
- We were transforming the data obtained from interviews and observations into a coding key. The researchers, in conjunction with an education program and teaching specialist, autonomously examined and scrutinized the documents containing the research data. The interview and observation data were categorized and grouped into suitable categories and themes.
- We performed a comparative study to assess the dependability of codings, researcher opinions, and expert opinions for both the individuals who were interviewed and those who were observed. After conducting a thorough comparative analysis, the researcher and the expert carefully scrutinized each subject, resulting in the identification of instances where the experts agreed or disagreed. Using the Miles and Huberman formula, we evaluated the reliability of the study and determined it to be 0.88, which indicates the level of disagreement or agreement. The formula for calculating reliability was expressed as the quotient of consensus divided by the sum of consensus and disagreement.
- The results were obtained through the analysis of data utilizing interview and observation coding methodologies, as well as the implementation of reliability studies. We conveyed the findings by immediately citing pertinent facts pertaining to the research inquiries. We clarified the findings, connected them to the study, and performed an analysis.

Results

The study encompassed discoveries about the cognitive abilities of pre-instruction kindergarten pupils in relation to their understanding of first aid. The present study aimed to assess the comprehension and knowledge levels of pre-teaching kindergarten students regarding the concept of

first aid. Specifically, the study sought to explore the definition of first aid, the distinction between the terms “patient” and “injured,” methods for recognizing when an individual required assistance, the purpose of an ambulance, appropriate responses to instances of bleeding, and strategies for ensuring personal and collective safety. We made inquiries about the potential treatment of the subject matter. We categorized the data derived from the responses to these inquiries into topics, categories, and codes. Table 1 provides a presentation of the details.

According to Table 1, based on the acquired codes and categories, the identified themes encompassed concepts such as “first aid, assistance, emergency, and hemorrhage.” The assessment aimed to gauge students’ pre-existing understanding of first aid principles, patient management, and injury treatment within the context of first aid. While one cohort of students mostly connected the concept of first aid with ambulances, another cohort related it to other scenarios, including accidents or injuries. Furthermore, a subset of pupils ($n = 4$) expressed unfamiliarity with the notion of first aid. The following statements provide examples of student viewpoints.

“I have been notified. The act of providing assistance is one possible consideration. Those who have sustained injuries or experienced an accident receive the administration of first aid. You could compare first aid to the emergency telephone number 112.” S2
“I have been notified. There have been instances of illness, accidents, hospitalization, and intravenous administration.” S6

“I did not know.” S9

“I am not familiar with the concept of first aid. On a certain day, my mother and I visited the Red Crescent. Flowers were sown.” S13

The results revealed that a significant proportion of the students ($n = 15$) exhibited the ability to distinguish between the concepts of harm and illness. Despite the students’ limited ability to provide a comprehensive explanation, they were able to articulate a partial distinction between these two concepts. Instances of student perspectives:

“There exists a distinction between the patient and the damaged individual. The patient becomes infected while the injured person falls, resulting in bleeding.” S5

“I have knowledge about the individual under consideration. An individual is experiencing illness. I am not acquainted with the individual who has sustained an injury. I am acting as a source of injury or harm for an individual.” S10

“There are differences between individuals who have sustained an injury and those who are unwell. If an

Table 1 The results of the students' first-aid knowledge levels prior to instruction

Themes	Categories	Codes	<i>f</i>
First aid	Description	Illness	3
		Virus	1
		Package	1
		Be injured	1
		Do not have an accident	3
		Helping	3
		Fire	1
		I didn't hear about it	4
		Ambulance	1
	Diseases	Those with a sore throat	1
		Germs	2
		I don't know	3
		Being sick differently than injured	4
	Unable to use a place	I don't know	6
		Who fell and bled somewhere	4
		Different from the patient	6
	Adult support	Calling parents	6
		Summoning the teacher	1
	Individual assistance	Helping yourself	13
	Functionality of ambulance	Taking vitamins	4
		Drinking medicine	9
		Eating vegetables/fruits	4
		Drinking herbal teas	3
		Do not go to the doctor when the illness lasts a long time	10
		Watching cartoons	1
		Drinking water	6
		Play a game	1
		Calling someone for help	3
		Something urgent	2
Emergency	Taking the patients	Taking the patients	4
		Calling by telling the parents	2
		1-1-2	9
		I don't know the ambulance number	5
	Ambulance calling methods	I know its color	13
		Trying to stop	6
		Don't go to the nurse	1
	Methods to stop bleeding	Wetting/pouring water	3
		Pressing manually	3
		Putting ice	1
		Spit	1
		Pressing napkin	6
		Applying a band-aid	6
		Putting leaves	1

Table 1 (continued)

Themes	Categories	Codes	<i>f</i>
Bleeding organs	Head	Nose	4
		Knee	9
	Limb	Foot	2
		Arm	4
		Fingers-	1
		Internal organs do not bleed	4
	Viscera	Brain	2
		I don't know where to bleed	2
		Internal organs bleed	1
		Heart and lung bleeds	2

individual sustains an injury, it indicates that they are not experiencing an illness. If somebody sustains an injury, it implies that they are not experiencing an illness. The term “sick” refers to a state of illness or poor health that extends over a significant period of time. For instance, in the context of bicycling, the occurrence of a bleeding knee does not signify a state of illness but rather indicates the presence of an injury.” S15

“I have received information about the sick individuals. I have not previously encountered any information regarding the injured individuals.” S11

After the pre-instruction interviews, we questioned students about their understanding of indicators indicating the need for assistance and their actions in such situations. Although a significant proportion of the student participants expressed their willingness to provide assistance independently, a subset of respondents ($n=8$) indicated their intention to seek support from adult figures, namely parents or guardians. Furthermore, the researchers provided suggestions for personalized assistance, including vitamin consumption, hydration through water intake, engagement with animated content, and the inclusion of vegetables and fruits in one's diet. Instances of student perspectives:

“Today, I encountered a companion who experienced a fall within the confines of a park setting. I grasp his hand firmly and guide him towards the designated classroom. I have created a bandage with the goal of stopping blood flow. Alternatively, I shall procure medication from my personal residence. If there is a lack of content, I will notify the instructor.” S4

“I take medication. I consume beverages made from the linden plant. I consume lemons. I consume fish oil supplements and vitamin supplements. I drink water.” S7

The preliminary interviews revealed that a significant proportion of the students demonstrated the ability to distinguish an ambulance from other vehicles, knew the designated emergency call number for ambulances, and demonstrated awareness of the appropriate circumstances for contacting emergency medical services. Nevertheless, a portion of the student population exhibited a lack of familiarity with the emergency contact number for ambulances. Instances of student perspectives:

“I am aware of the information you have provided. The patients are transported by ambulance. Often painted in white, the ambulance boasts audible warning devices known as sirens. 1-1-2.” S8

“The medical staff transports the patients to their beds. The color combination consists of white and red. Emergency medical services commonly associate the numerical sequence “1-1-2” with the telephone number to contact an ambulance.” S1

“Someone has alerted me to the presence of an ambulance. The ambulance provides medical assistance to all individuals. The hue of the ambulance bears resemblance to that of our vehicle. 1-1-2...” S4

When queried about appropriate actions to take in the event of bleeding and potential sites of bleeding on their bodies, a significant proportion of students expressed their intention to mitigate the bleeding by employing methods such as staunching the flow and applying a napkin or band-aid to the affected regions. Students also mentioned that bleeding could occur in external body areas like the knees, arms, and head. Instances of student perspectives:

“In instances where blood is present, my father occasionally moistens it; however, the act of moistening exacerbates the pain, prompting him to afterwards dry it using a dry napkin.” S2

“Indeed, on occasion, I experience instances of falling. My maternal figure provided a napkin to mitigate the flow of blood. In the event that hemostasis did not occur, the recommended course of action would involve applying pressure with a napkin, followed by the use of a band-aid.” S6

“For instance, people can bleed in their feet and brains. The occurrence of bleeding within our internal organs is absent.” S12

The Results about Views of Kindergarten Students about First Aid After Instruction

The study investigated the impact of instructional intervention on kindergarten pupils’ knowledge acquisition in the domain of first aid. We conducted a 10-week teaching practice on first aid and then analyzed the students’ responses to first aid-related questions. The data revealed several prominent themes, including first aid, bleeding, emergency situations, and providing assistance. Table 2 displays the themes, categories, and codes derived from the data collected following the instructional intervention.

Upon analyzing the data shown in Table 2, it becomes evident that there is a discernible shift in the students’ knowledge levels and awareness of first aid following the training. Notably, we observe the emergence of themes such as “first aid, bleeding, emergency, and helping,” accompanied by variations in the codes and categories associated with these themes.

Upon detailed analysis of the theme “first aid,” two prominent categories emerge: “definition” and “first aider.” Students commonly understand first aid as the implementation of measures aimed at intervening in instances of bleeding and damage, or as a means to mitigate the deterioration of an individual’s condition. Based on the provided data, all students demonstrated knowledge and the ability to articulate the concept of first aid. Furthermore, students widely acknowledge that individuals from all backgrounds can acquire the skill of first aid administration, and they understand that first aid procedures do not involve the administration of drugs. A singular student expressed the viewpoint that first aid is not universally applicable. The following are the perspectives expressed by the students:

“The initial responder to an injured individual. Sometimes, first aid refers to the process of providing assistance to an injured individual.” S11

“In the event of a fall resulting in a bleeding knee, every person has the capacity to provide assistance, a practice commonly referred to as first aid.” S15

“As an illustration, in the event that a companion sustains a fall resulting in a wound, I promptly administer a bandage. I am capable of administering initial medical assistance.” S6

The study’s results questioned the participating students about their ability to respond to instances of bleeding from injuries. The collected data showed that all the students were knowledgeable about the appropriate actions to take in such circumstances. The students expressed the following perspectives, each shaped by their unique experiences:

“I applied a sterile adhesive bandage to the site of hemorrhage. In the absence of a band-aid, a napkin can serve as a substitute. However, if the object in question exceeds a certain size threshold, I will notify my maternal figure.” S6

“I will promptly apply a bandage to the affected area. In the event that I do not possess the item in question, I will proceed to get it from a commercial establishment. Initially, I will apply a cold compress to the affected area in order to mitigate any potential swelling.” S9

“When an individual has bleeding in a particular area, no significant physiological or pathological consequences occur. I promptly apply pressure to the object using my hand or a nearby item. I attempt to stop the flow of blood by implementing pressure. In the event that the bleeding persists, I would promptly notify either the nurse or the instructor.” S12

Furthermore, the conducted research revealed that the pupils could locate emergency circumstances and understood the appropriate actions to take in these situations. The emergency theme encompasses “ambulance, notification situations, and appropriate actions to take during emergency calls.” The results of this study indicate that a significant proportion of students possess a shared understanding of accidents or severe injuries as constituting major crises and express consensus regarding the necessity of alerting emergency medical services, such as ambulances, in such situations. Students widely recognize the readily accessible emergency hotline number 112 for immediate assistance. Moreover, students possess the capacity to discern an ambulance truck from other types of vehicles. Additionally, the individual asserted that while placing emergency calls, a significant proportion of students tend to employ easily identifiable landmarks in their vicinity to describe the location, provide their residential address or the name of their apartment complex, and refrain from terminating the call before the other party terminates the conversation. The following examples illustrate students’ perspectives:

“I am aware of the emergency contact number for ambulances, which is 112. The vehicle in question possesses dimensions that classify it as a medium-sized car, and its auditory warning device emits a sound of considerable intensity. The object has a trichromatic color scheme consisting of red, white, and blue hues.” S9

Table 2 The results about the knowledge of first aid of kindergarten students after instruction

Themes	Categories	Codes	<i>f</i>		
First aid	Description	Earthquake	2		
		A place like a hospital	2		
		Helping someone when s/he falls off	2		
		Helping an injured person	1		
		Helping to prevent the situation from getting worse	1		
		Bleeding	5		
		Injury	5		
		knee bleeding	5		
		First aid to the injured	1		
		Call 112	1		
	First aider	Help	2		
		Everybody	8		
		Doctors	2		
		Teachers	5		
		first aider	15		
		Does not give medicine	10		
		Experts	1		
		Not everyone does	1		
		The first person to arrive at the injured person	1		
		They treat	1		
		Bleeding	The methods for stopping bleeding	Cotton press	5
				Pressing a napkin	5
				Plaster	5
Inform the elder	1				
Wash with water	3				
Pressing the bleeding area with hand	1				
Tell the teacher	1				
Put ice	3				
Emergency	Ambulance	112	15		
		Red and white	15		
		It says 112 on it	10		
		There's light on top	2		
		Siren is loud	2		
	Notification situations	Big occasions	10		
		When it's needed	5		
		If the leg is broken	1		
	What to do in emergency calls	I describe my house	7		
		I say whatever is around	13		
		I will tell you the name of the apartment	3		
		I don't hang up the phone until he hangs up	10		
		Helping	People to ask for support	I inform the adult	10
I inform my mother/father	5				
I inform the teacher	3				
I inform my friend's parents	1				
I inform the neighbor	1				
I notify the school nurse	2				
I tell my aunt	1				

“...112. Additionally, I possess knowledge of the emergency contact number for the police, which is 155. Indeed, a merger has taken place. The ambulance’s lights are white, similar to the coloration of these particular shades. Contrarily, red stripes adorn an automobile.” S15

In the event of a first aid requirement, all students expressed their intention to provide assistance when queried. Nevertheless, a significant proportion of students stated that they would seek assistance by disclosing the circumstances to a responsible adult. While a portion of the student participants expressed their intention to notify their parents about incidents occurring near their residences, another group indicated their preference to report incidents requiring first aid within the school to either the school nurse or teachers. The following are the students’ perspectives on this topic, accompanied by illustrative examples:

“In the event of an occurrence, I promptly notify a responsible adult... In the event that I find myself on school premises, I promptly notify either my teacher or the school nurse. Once I reach my home, I relay the same information to my parents.” S6

“On certain occasions, instances of falling during recreational activities at the educational institution occur, prompting the affected individuals to report the incident to their respective teacher. An acquaintance of mine suffered a bee sting the day before. Subsequently, he reported the incident to our educator, who promptly escorted him to the school nurse.” S3

Discussion and Conclusion

The study investigated the instructional design of first-aid education for kindergarten pupils. We implemented the instructional design process called as “Gagne’s Nine Events of Instruction” adapted from Gagne, Briggs, and Wager’s model (1992). Initially, we conducted a series of interviews to determine the specific first aid requirements of the pupils. The results obtained after the instruction sessions reveal recurring themes related to “first aid,” “assistance,” “hemorrhaging,” and “emergencies.” The aforementioned themes manifested in a similar manner after the implementation of the instructional intervention. The applications carried out according to Gagne’s Nine Events of Instruction model are shown in Table 3, respectively, according to their stages.

This type of first aid program is a process in which children gain knowledge and skills and become more aware and confident in dealing with emergencies. In the first stage, students’ current knowledge and reactions to emergencies were determined through interviews with the school principal, teachers, and the school nurse. These interviews determined which areas the training should focus on and lay the foundation of the program. In the second stage, concrete goals were set for students. These goals not only teach children basic first aid information but also how to stay calm and help others in emergencies. Objectives provided a reference to measure what skills students acquired by the end of the program. The learning process was supported by various activities for children to apply what they learned. Weekly topics enabled children to develop first-aid skills step by step. Through practices such as simulations and role-playing activities,

Table 3 Nine steps of Gagne’s framework

Step	What they learned	What they did
Gain attention of the students	We met with different people and talked about when first aid is needed	Interview with school principal, school nurse, and kindergarten children
Inform students of the objectives	At the end of the instruction, kindergarten children learned:	Recognizing when help was needed, calling for help, and administering basic first aid
Stimulate recall for prior learning	Checking that the area was safe before calling for help	Check the safe area and call 112
Present the content	Acting in a way that put the person at ease when help was needed	Approaching the injured person gently and calmly
Provide learning guidance	They were taught how to talk to the injured person and how to help him	Calming conversations like “I understand, but don’t panic.”
Elicit performance	Children learned how to recognize serious injuries and administer first aid	First aid in case of burn or sprain
Provide feedback	It was emphasized that it was necessary to remain calm in emergency situations	Call 112 quickly, without panicking
Assess performance	During the 10-week course, it was observed whether the children applied what they learned correctly	Calling 112 correctly and explaining the situation
Enhance retention and transfer	After each lesson, students and teachers were evaluated	Checking how prepared students were in a real situation

students prepared for real situations and gained the ability to use the information they learned in real life. Instructors gave constant feedback to students and determined in which areas they were successful and in which areas they needed to improve. This feedback process helped students see their progress and understand their shortcomings. Repetition at the end of each lesson ensured that knowledge became permanent and reinforced children's ability to react correctly in emergencies. Additionally, involving teachers and parents in the process enabled children to use what they learned more effectively in their daily lives. At the end of the program, children were evaluated on how they would apply what they learned in a real emergency. This evaluation is critical for measuring the success of the program and identifying improvements that need to be made in future training. Some challenges could affect children's learning and make it difficult to implement the program successfully. For example, simulating a real emergency was important for children to develop their experience, but this was difficult to do.

According to the steps about what the pupils learned and did shown in Table 3, the results of the research indicate that there has been a notable enhancement in kindergarten pupils' capacity to articulate the circumstances and surroundings when they encounter an individual requiring immediate medical assistance. Furthermore, they have acquired the skill to promptly notify responsible adults or contact the emergency hotline, denoted as 112. The findings of this study emphasize that the positive development of students' knowledge and skills in the subject area as a result of effective instructional design. Therefore, we can confidently state that we effectively accomplished the research objective. The study designed according to an instructional design should contribute to specific learning objectives. According to the related literature, after applying a test scenario to the children, they could learn and apply basic first aid (Tse et al., 2023). Accordingly, our study results are parallel to that. So, it could be said to be important that test scenarios must be carefully considered when investigating teaching first aid in early childhood is students' reactions in real—life first aid situations after participating in educational programs. It is more effective way to learning first aid especially for young learners, and also they react more effective behaviors when they encounter any these circumstances.

The present study investigated an instructional design strategy with the objective of delivering first aid training to pupils in kindergarten. We developed the instructional design using the Gagne's Nine Events of Instruction. Initially, we conducted a series of first aid-related interviews to understand the specific needs of the students. The analysis of these interviews revealed recurring themes, including "first aid," "assistance," "hemorrhaging," and "emergency." The implementation of the teaching led to the resurgence of the same themes in the students' responses.

Abelairas – Gomez et al. (2020) stand out that it is important to previously train teachers and kindergarten children by including first aid program contents in school programs. It is crucial to train regularlay first aid in schools (Tse et al., 2023). Schools are good places to teach first aid, and especially for kindergartens pupils. Moreover, teaching young children both resuscitative and non-resuscitative first aid is crucial, and so teaching first aid to pupils could foster the social responsibility that society needs. Training children in schools make them learn how to handle an emergency situations (Tse et al., 2023).

According to the research findings, kindergarten pupils have improved their ability to recognize their surroundings and effectively communicate critical information to the appropriate authorities in situations requiring immediate medical attention. The results of this study demonstrate the efficacy of the educational interventions provided to the students, as evidenced by the satisfactory development of their relevant skills. We can assert that the instructional design has effectively fulfilled its intended objective in the current setting. Establishing a community culture centered around first aid, starting with kindergarten-aged children, has the potential to protect the most valuable resource, namely human capital, from incapacitation and reduce mortality rates. The study's kindergarten pupils received instruction that sparked further discussions with parents and relatives, thereby fostering societal awareness and enhancing social knowledge on this topic. Moreover, it could be said health and safety of children play a crucial role in the future of societies. İbrahimoglu et al. (2024) say in their study that it is crucial for children learn to cope with these situations requiring first-aid and keep themselves be healthy and safe. So, it could be said that it is significant to train them about first aid in their early development. Children don't learn in the same way. So, it is important to prepare tailored training program of first aid education especially for children. First aid education is limited in its coverage of several first aid themes due to the need for it to be simply and rapidly available to school-aged children (Sulaymonova, 2024).

As a result, this process is a journey in which both theoretical knowledge and practical skills are gained. Not only do children learn how to respond to emergencies, but they also understand the importance of staying calm and calling for help correctly. Continuous feedback, hands-on learning, and necessary adaptations are essential for the process to be effective. So, it is crucial for early childhood education that the training program is to instruct students in identifying situations, summoning assistance, and administering immediate first aid until professional medical treatment arrives. Therefore, it should be suggested that the more training program of first aid and test scenarios should be more effective to develop early childhood education practically.

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Declarations

Competing Interests The authors declare no competing interests.

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