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Gamifying Safety Education: A Board-game Approach for Childhood Injury Prevention in Rural Southwestern China

Abstract

In southwestern China's rural, mountainous regions, elementary school-aged children are exposed to unique safety hazards, such as poisonous plants, road accidents on primitive roads, and water-related dangers. This study focuses on É-Dié-Cūn, a village in Yunnan Province's Honghe Hani and Yi Autonomous Prefecture, where research highlighted prevalent unintentional childhood injuries exacerbated by factors like inadequate family supervision, limited school resources, and language barriers. Addressing these challenges, our project developed "Watch Out Ele!", an educational board game designed for grades 4 to 6 students with proficient Mandarin Chinese. The game encompasses four key themes: Natural Disasters, Outdoor Safety, Food Safety, and Health & Emergency, and is complemented by a suite of supporting materials for local educators. By April 2023, in collaboration with WoW Education, a local NGO, "Watch Out Ele!" was introduced in two schools. Initial feedback through follow-up surveys revealed a positive reception and ongoing engagement, with suggestions for further content localization. This initiative demonstrates the potential of gamification in enhancing safety education in challenging rural environments, offering insights into impactful learning tools.

Keywords: gamification, childhood safety, rural education, educational board-game, localization

Safety education is essential for the healthy growth of elementary school-aged children, particularly in environments where they are exposed to a variety of hazards. The Office of China National Committee for Disaster Reduction (2007) emphasizes the need for comprehensive safety education covering natural disasters, accidents, public health, and food safety for elementary school children. That is, these children are in a critical stage of physical and mental development, where limited awareness and understanding of safety risks makes them vulnerable.

In É-Dié-Cūn, a small town in Honghe County, Yunnan Province, China, unique safety challenges are prevalent.

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Observations during a volunteer teaching program in the summer of 2022 revealed significant safety risks for children who lacked effective approaches to evitable injuries. These risks include poisonous wild plants, road accidents on unsurfaced roads, and high drowning incidences in unattended water bodies. Further, elementary schools in É-Dié-Cūn lacked sufficient resources for teachers to develop effective and engaging safety education, particularly local safety hazards.

Responding to these challenges, the initiative led by Team Ever-Safe focused on providing practical, localized safety education to the children of É-Dié-Cūn. A central component of this initiative is the educational board-game "Watch Out Ele!", developed to enhance safety awareness among children and empower them to navigate real-life safety scenarios effectively. This game, tailored to the rural context of É-Dié-Cūn, was formulated based on primary in-depth research into the local living environment and educational needs. In collaboration with a local NGO, a pilot test of the program was conducted in Baohua Town, Honghe County. By the spring of 2023, the initial phase of implementation in local schools was completed, with plans for further expansion over the next three years.

This paper explores the development and implementation of "Watch Out Ele!", evaluating its impact on safety education in rural China. The study aims to provide valuable insights into the effectiveness of gamified learning tools in enhancing safety awareness among children in rural settings, contributing to the field of educational innovation and child safety.

Literature Review

Safety Education

As stated in the book *Safe knowledge for elementary school students* (2007) by the Office of China National Committee for Disaster Reduction, safety education for elementary school children needed to address the general topics of natural disasters, accidents, public health, and food safety.

Safety Concerns of Children in Rural Mountainous China

According to a survey conducted by scholars on left-behind children in rural areas of Yunnan Province, 20 left-behind children who participated in the survey have all faced and experienced dangerous behaviors in the past six months, including burns, animal bites, falls and

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bruises. Among them, drowning accidents, natural disasters and other problems are much more likely to happen to rural students than urban students (Zhou & Hu, 2022), which seriously affects the growth of rural children.

Unique Hazards

In comparison with educating children about safety in urban China, the implementation of safety education in rural China faces complicated challenges (Xi, 2018; Zhou & Hu, 2022). The living environment of rural areas in China have unique characteristics such as complicated natural environments, crude road facilities, and unhealthy living habits, etc., thus breeding risks of drowning in unsupervised water banks or wild waters, harms caused by natural disasters like wildfires or mudslides (Zhou & Hu, 2022), and wild animals, or poisonous wild plants (Xi, 2018).

Role of Families in Education

The high proportion of left-behind children in rural China is also a challenge in keeping rural children safe (Xi, 2018; Zhou & Hu, 2022). Left-behind children are referred as children under the age of fourteen whose parents or one of the parents are away for a long time to work, forcing these children to stay with other family members (Zhou & Hu, 2022). Instead of receiving sufficient supervision and guidance from their direct parents, left-behind children are left with adults who tend to be less aware of reinforcing safety education at home (Xi, 2018). Furthermore, the prevailing perception of school being responsible for educating children among guardians of rural children is a contributing factor behind the insufficient presence of families in implementing safe education (Zhou & Hu, 2022). However, what family education lacked couldn't be made up for elsewhere. Therefore, compared to urban children, rural children lacked access to a variety of safety education resources (Xi, 2018; Zhou & Hu, 2022).

Status Quo of Safety Education in Honghe County

According to the information obtained by WoW Education, Honghe County had implemented the "1-5-3 requirement" across its primary schools. The numbers refer to the specific time commitments for safety education: "designate one minute before class every day, five minutes before dismissal, and thirty minutes for class meetings every week." The goal of such a requirement was to achieve 100% coverage of safety education (D. Dong, personal communication, Jan 3rd, 2023).

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Educational Games

Existing Solutions

The child safety education discussed in this initiative refers to the educational process targeting children aged 6-12, aiming to cultivate knowledge, skills, and awareness of self-protection. Safety education solutions for children need to stress utilization of multimedia devices and incorporating situational representation to cultivate rule awareness (Pan, 2022). Based on the research findings of multiple scholars (C. Chen, 2005; C.Y Chen, 2019; Ji, 2018; Liang, 2022), the following summarizes the characteristics of four common safety education solutions and their advantages and limitations when applied to rural settings:

Table 1

Analysis of Existing Safety Education Solutions for School-Aged Children

Form	Contents	Advantages	Limitations
Teacher-led Activities	Lectures, pre-recorded videos	Simultaneous teacher-student interactions	Lack of connections between theoretical knowledge and real-life application
Illustrated Books	Illustrated narratives about safety	Informative, vivid, comprehensible	Primarily contextualized in urban settings and lacked content targeting rural settings; lacked interactivity without facilitation
Children's Songs and Cartoon Animations	Multimodal content about safety	Informative, vivid, comprehensible, and suitable for oral communication	Lacked complexity and depth of content; less relevant to rural settings; limited access to high-quality ones due to time and digital supplies constraints in the rural area
Safety Education Board Games	Interactive Gamification of the learning process	Engaging especially for younger learners, effective in knowledge acquisition and retainment	Primarily contextualized in urban settings; more expensive

Board-games in Education

Board-games have long been viewed as entertainment tools, but their use extend beyond leisure, serving as tools for psychological counseling to enhance emotional awareness, reduce defensiveness, and improve expressive abilities (Huang & Liu, 2005). From another perspective, board-games can be integrated into education as a form of gamification that engages students in learning.

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Previous Employment of Board-games

Firstly, by assigning educational value to popular games like poker for teaching mathematical concepts; secondly, through specially designed or homemade games specifically integrated into teaching (Cai, 2013). Increasingly, educators are leveraging board games to augment learning experiences, enhancing students' engagement and educational outcomes.

Engagement for students

Vygotsky's theories (Zhang, 2013) emphasize the cognitive importance of games, including abstract thinking development and providing socially supportive learning environments. In recent years, board-games have been gradually integrated into educational elements and applied to learning and life as an educational means. They enrich students' practical skills and knowledge, enhance thinking, memory, and judgment, and improve social interaction, teamwork, and communication skills. Further, board-games allow "students to develop their own learning context and control their own learning progress with the help of their peers" (Hou, 2016). They also work to foster positive relationships among students, parents, and teachers (Chen, 2005).

Effects of Using Board-games in Education

Relevant studies conducted by in Taiwan from 2016 to 2018 indicate that board-games can improve students' learning effectiveness. Out of fifteen board-games that were used, 2 were self-made and 1 was relevant to safety education regarding fire hazards (Dai & Zheng, 2017). Though it was only 1 board-game was related to safety education, it is indicated to be incredibly successful in improving students' understanding of safe responses to fire hazards, exemplifying that safety education can be effectively taught through board-games.

Board-game Design

The design process of board games considers user needs, design mechanisms, and thematic content. The design mechanisms can include cooperative gameplay, dice rolling, memory challenges, pattern recognition, storytelling, and various other types (Liang, 2022).

Gamification

Design Principles of Gamification. A study by Li et al. (2023) highlights the important usage of notable design models such as the PBL triangle (points, badges,

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leaderboards), the gamification design model, and the MDA (Mechanics, Dynamics, Aesthetics) model. The PBL triangle emphasizes an award system that can motivate players through providing immediate feedback on their actions, and the MDA model focuses on the game components, strategies involved in gameplay, and the emotional experience of the player.

Benefits in Education. These studies also confirm that gamification can significantly enhance student motivation, and interaction, contributing to a more immersive learning experience (Li et al., 2023).

Methodology

Data Collection

Data collection mainly included questionnaires, interviews, and literature reviews.

Questionnaires

Purpose. To evaluate the safety knowledge and attitude towards safety education of elementary students in É-Dié-Cūn, and gather data on existing safety education courses from teachers, and their opinions, expectations, and preferences regarding content, teaching methods, and possible alternatives.

Content. To achieve the above purpose thirteen students were selected at random in grades 4 to 6 from GuiDeHai Primary School, and was given 7 questions such as: "What do you do when a stranger gives you sweets?". While with help from WoW Education, eleven teachers, 2 of which participated in a follow-up interview, from elementary schools across Honghe County were given 7 questions such as: "In your opinion, what aspects of the current safety education could be improved?" (See Appendix 1 and 2 for full questionnaires).

Interviews

Purpose. Understand critical insights into local safety hazards in Honghe County, informing the localization of educational content.

Content. Interviews were conducted with local primary school teachers in É-Dié-Cūn, both in-person and online, they were asked questions such as: "Do you usually provide safety education to children? How often? What method is generally used?" (See Appendix 3).

Literature Review

Literature review covered topics such as assessing the status of safety

education for rural elementary school children in China; judging the advantages and limitations of existing solutions, and their potential feasibility for safety education; and learning the design principles of children's board-games.

Results and Analysis

Questionnaire Investigation

Elementary School Students

Coverage of safety education. All participating students reported having been exposed to safety education. Among them, 2 students felt they had a good understanding, 8 students (61%) felt that they had some understanding of safety knowledge, and 3 students felt they had limited understanding.

Attitude towards learning safety knowledge. All participating students expressed their desire to comprehensively understand topics such as food safety, traffic safety, prevention of natural disasters, and personal hygiene; all of which are severe local safety issues.

Preferred methods of learning safety knowledge. All participating students expressed their willingness to receive safety education through teacher-led instruction, parental guidance, and gamified learning techniques such as reading picture books, and playing games.

Elementary School Teachers

Safety education was valued and stressed in Honghe County:

1. 90% of teachers indicated that they often held safety education classes as part of the curriculum requirements.
2. 100% of teachers believed that "students' safety knowledge is insufficient, and more education is urgently needed."
3. 73% of teachers believed that “safety education content and pedagogical approaches were relatively outdated, resulting in the low level of comprehension and acquisition."
4. 55% of teachers considered the safety education content “barely relevant to rural life and lacked practicality.

Interview Investigation

D. Dong from WoW Education collected qualitative data through interviews with local teachers, who, beyond the scope of the questionnaires, highlighted the need for topics like safe electricity usage and drowning prevention, citing the unsupervised water banks and wild rivers in Honghe County (D. Dong, personal communication, January 8th, 2023). The interviews also

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revealed language barriers as a significant challenge; in the Honghe Hani and Yi Autonomous Prefecture, children primarily speak Tibeto-Burman ethnic languages such as Yi and Hani, leading to Mandarin Chinese safety instructions often being misunderstood, underscoring the need for localized language solutions (D. Dong, personal communication, March 24th, 2023).

Development of the Program

Targeting elementary school students from grades 4 to 6, the program considers the factor of the widespread use of ethnic minority languages in the area and a "lower Mandarin proficiency from younger students," the game was designed to be easily understood and engaging for these children. The comprehensive program consists of four parts that supports the integration of interactive, engaging and localized safety education content for schools in rural China: a board-game, a video library, scenario-based activities, and teacher training sessions.

Design and Use of the Board-game

Named “Watch Out Ele!”, the board-game serves as the core of this program, where it encourages an interactive learning environment for children learn, inspire, and reinforce their knowledge through enjoyable interactions.

Visual Design

The board-game incorporates an elephant, the representative animal of Yunnan, throughout to visually attract the children to the game and guide the children in absorbing knowledge while enjoying the game (see Figure 1). Further, the design uses a balance of warm and cool colors, since "color is very important for enhancing memory and visual perception" (Simpson, 2018). That is, texts and visuals were designed to elicit students' interest and build intuitive comprehension links by using “more attention-grabbing colors to encourage learning, focus, alertness, and awareness” (Simpson, 2018). Moreover, icons such as a wrench are used to guide students in understanding different types of questions and thematic content, facilitating reading and comprehension.

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Figure 1

From left to right: package design, internal display, game board and tokens

Note. Photo of the board game taken by Team Ever-Safe, 2023.



Figure 2

Design of game cards

Note. Visual designed by Team Ever-Safe, 2023.

Game Rules

Accommodating up to four players, the game employs the mechanism of tossing a six-sided die and moving the token according to the resulting number. After the player stops, they will pick a question card that corresponds with the landed color to answer safety-related questions and have their responses judged by the referee according to the answer sheet. If the student answers correctly, they will automatically enter the next round, and vice versa; the first to reach the finish line is the winner and receive a badge indicating that they excel in that round of safety knowledge. That is, according to the PBL triangle, it is important to motivate students by providing immediate feedback on their actions: losing will motivate the student to learn more, winning will motivate the student to aid others in learning.

Printed rulebooks and answer sheets are included in the pack to facilitate students and teachers in understanding the rules and evaluating the accuracy of answers. In scenarios where students are unable to answer or provide incorrect responses, the referee can read out the

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correct answers from the answer sheet to help students learn the correct safety knowledge. At the same time, the game encourages players to explain their answers which will be judged by the referee and all players as they interact with each other, fostering students' critical thinking and communicative skills. See Appendix 3 for the detailed content of the rulebook.

Game Questions

Questions focus on four themes: Natural Disasters, Outdoor Safety, Food Safety, and Health & Emergency. Each theme includes three types of game cards: Question and Answer (Q&A), Performance, and Equipment. Each type of game card inspires a different dynamic, aligning with the MDA model of gamification, such as: performance cards encourage the strategy of demonstration in understanding, and equipment cards indicate the strategy of identification. The initial version of the board game consisted of 32 questions, but question card packs will be upgraded each semester to provide new questions to keep students engaged. Examples are presented in Table 2.

Table 2

Sample Questions of "Watch Out Ele!"

Theme	Contents	Type	Answer
Food Safety	You and your friend find an unknown colorful wild fruit on your way home. Can you eat it?	Q&A	No. Tell your friend not to eat the wild fruit either.
Food Safety	Your friend picks a cucumber directly from the field and hands it to you. What do you do with it?	Performance	Perform a washing motion: open the tap and rub the cucumber back and forth.
Health and Emergency	You have twisted your ankle. Now it looks red and swollen, or black and blue. What tools do you need?	Equipment	Ice cubes, ice water, cold towels.
Health and Emergency	How to deal with nose bleeding?	Performance	Sit up straight and lean forward. Remain in an upright position to lower the blood pressure in the nasal veins. Pinch the nostrils with the thumb and index finger.
Outdoor Safety	How to stay safe when you are walking on a mountain road?	Q&A	Stay away from vehicles. Be aware of blind spots around the corners. Do not walk side-by-side in groups. Avoid chasing each other and playing around.

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Outdoor Safety	Someone is drowning! What tools do you need to help? How do you use them?	Equipment	Find the "bamboo stick" or the "swimming ring" prop card. If the drowning person is close to the shoreside, use a rope or stick for this person to grab on and be pulled onshore.

Design and Use of Video Library

The video library offers a curated collection of high-quality online content consistent with the four central safety knowledge themes. The videos range from animation to real-life scenarios for effective demonstration of appropriate responses to safety hazards. Such videos enable students to learn through a visual demonstration (linking to the Performance card) rather than simply answering questions. To address the limited familiarity with technology in rural areas, the video library is organized in a digital file containing video links. Each link is marked with the corresponding theme, duration, and suitable grade level, enabling the teachers to easily locate and select videos that aligns with their instructional content (see Table 3).

Each video ranges from 1 to 5 minutes, optimizing the engagement of students and obtainment of knowledge. That is, student engagement is at 100% with videos shorter than 6 minutes, dropping significantly as videos lengthen: 50% engagement at 9 to 12 minutes, and only 20% at 12 to 40 minutes (Guo et al., 2016).

Table 3

Video Library Examples

Theme	Title	Duration	Suggested Audience
Food Safety	Why you shouldn't eat foods offered by strangers	00:52	Grades 1-3
Outdoor Safety	Things you must know about protecting yourself from lightning strikes in the rural area	12:47	Grades 4-6
Health and Emergency	Correct Usage of Band-Aids	00:32	All grades

Design and Use of Scenario-based Activities

The program features five scenario-based activities—How to Cross the Street, Identifying Expired Food, What Mushrooms Are Edible, What to Do in Drowning Situations, and How to Treat Injuries (Table 4)—each offering an immersive hands-on learning experience. These activities, facilitated with a pack of

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props (Figure 3), are designed to aid teachers guide students in learning and practicing correct safety responses in simulated scenarios. For instance, "Crossing the Street" involves a scenario with props simulating a controlled intersection, where students role-play as vehicles or pedestrians, learning to navigate complex traffic conditions safely. This approach ensures that children not only learn about safety theoretically but also gain practical skills through engaging, real-world simulations.



Figure 3

Prop package for scenario-based activities

Note. The props shown in this box contained sample medical supplies for the "How to Treat Injuries" activity. Photo by Team Ever-Safe, 2023.

Table 4

Sample Scenario-Based Activities

Theme	Scenario	Props
Which mushrooms are edible?	Present mushrooms commonly found in Honghe County and prop cards//replica of other toxic food (e.g., wild berries) and practice distinguishing them	Prop cards, replicas, and mushroom specimens if applicable
Crossing the Street	Use stickers on the ground to simulate a crosswalk, use prop cards to simulate traffic lights, and assign some children to act as cars and others as pedestrians crossing the road	White stickers, prop cards representing red light and green light
Identifying Expired Food	Present expired and unregulated food products, and have students choose the safe-to-eat ones	Expired and unregulated food products

Teacher Training Sessions

The involvement of local teachers is crucial for children to comprehend safety knowledge. In these sessions, teachers will receive online training from WoW Education to learn how to guide the use of the board-game and scenario-based activities. That is, the teachers will be scaffolded to facilitate games and serve as the referee in the board-game. When students do not understand the question or provide incorrect answers, the referee will be there to explain and demonstrate.

Crowd-funding

As a public welfare initiative, this

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program used crowdfunding to cover the costs. The estimated initial budget is listed below.

Table 5

Initial Budget as of January 2023

Item	Unit Price	Quantity	Sum (RMB)	Notes
Production of the board game	80	30	2400	Board game for 10 classes, 3 sets for each class
Material packages for scenario-based Activities	30	10	300	Material packages for 10 classes, 1 set for each class
Shipping cost	30	6	180	Shipping the board games and material packages to Honghe County
Teacher training stipend	200	10	2000	Stipend to train 10 local schoolteachers and run the program during the semester
Total			**4880**	



Figure 4

Promotion materials distributed online and the amount raised

Note. Screen captures of text, team logo, and poster. Team EverSafe, 2023.

The initiative, crowdfunded on "17行善" (17xs.org) by the Ningbo Shanyuan Public Welfare Foundation, utilized diverse promotional strategies, including WeChat posts and in-person campaigns. As of April 2023, it successfully raised RMB 12,401.70, surpassing its goal (Table 5). Excess funds will produce additional "Watch Out Ele!" board games and support the

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project's expansion in Baohua Town and Honghe County.

Implementation and Sustainability

Implementation Plan

The implementation plan consists of nine stages: design, sample production, testing inside the team, pilot testing at school, crowdfunding, improvement, quantity production, school implementation, and feedback collection (Table 6).

Table 6
Implementation Plan in Stages

Stage	Time
Design planning	2023.1
Sample production	2023.1
Testing inside the team	2023.1
Pilot testing at school	2023.1
Crowdfunding	2023.1
Improvements	2023.2
Quantity production	2023.2
Shipping, teacher training, and program implementation at schools	2023.3.1-6.30
Feedback collection	2023.7.15

Sustainability Plan

Content Sustainability

Semester updates to the solution package will be provided in order to keep the content continuously attractive for children's participation and facilitate their learning of new knowledge.

Development sustainability

According to the initiative's collaborator WoW Education, a charity organization in É-Dié-Cūn, there is a total of 94 elementary schools and over 100 teaching sites in Honghe County. In the spring semester of 2023, the project plans to expand from É-Dié-Cūn to six schools in Baohua Town. By the end of 2023, the plan is to further expand to 20 schools in Baohua Town and approximately 50 schools across Honghe County in 2024. The goal is to cover 100 teaching sites in Honghe County by 2025. The project would continue using crowdfunding to reach the target number of schools.

Implementation Results and

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Discussion

Achievement Analysis Overview

Application results

The evaluation criteria include students' knowledge acquisition level, participation and preference; the frequency of program usage, and teachers' satisfaction with the application. Interviews and questionnaires will be conducted every two months to obtain information for analysis, assisting in further optimizing the program. The expected goals for each specific item are as follows:

1. The level of students' safety knowledge should improve, primarily assessed by the "number of knowledge points mastered." Pre- and post-test assessments would be conducted through questionnaires (see Appendix 1).

2. The level of student participation and preference should reach over 80%, assessed by criteria such as "degree of enjoyment participating in this board game and simulation game," "willingness to continue using this solution," and "degree of enjoyment watching video content." Surveys and interviews would be conducted to assess students.

3. Teachers' satisfaction with the application should reach over 80%, assessed through questionnaires.

Promotion results

The evaluation criteria will take into account the number and scope of schools where the program was implemented, with an evaluation of the completion rate of the schools listed in the Sustainability Plan. The annual target is to reach 80%.

Application Results of the Program

On January 29, 2023, with the assistance of WoW Education, the initial pilot testing was successfully done at GuiDeHai Primary School of Baohua Town, Honghe County. Over twenty elementary students participated in the scenario-based activities and video viewing, and three randomly selected students from grades 4 to 6 participated in the board-game. Afterwards, participating students and teachers were surveyed to evaluate the application results.

Student Participation in Board-game

According to observations from WoW Education, all students were able to understand the game rules, actively participate in the game, and engage in thoughtful discussion amongst each other,

achieving the initial goal of inspiring students through interactive games.

Through completing two knowledge questionnaires before and after the game to analyze the effectiveness of the program, all three students who participated in the board-game showed a significant increase in knowledge levels, with a 20% improvement in test scores. Together, the three students raised nine safety-related questions after playing the game, which would be included in the next round of update. Additionally, through interviews conducted by WoW Education, on average, students acquired and recited three new safety knowledge points. When asked if they would like to play again next time, all three students found the activity enjoyable and expressed their desire to participate again. On the following day of the game, when WoW Education returned to the school, question such as "Teacher, did you bring the game today?" were raised, indirectly confirming students' enthusiasm towards the game.



Figure 5

Students at GuiDeHai Primary Playing the Board-game

Note. Elder students with higher Mandarin Chinese proficiency were helping to read aloud the questions for the younger ones. Photo by WoW Education, 2023.

Student Participation in Scenario-based activities

According to interviews from WoW Education staff, 30% of the students from GuiDeHai that participated already knew the knowledge of "red light means to stop, green light means to go". After completing five rounds of the scenario-based activities (see Figure 6), all students were able to state this knowledge and perform "look left first, then right before crossing the pedestrian crosswalk"



accurately.

Figure 6

Students at GuiDeHai Primary performing the activity "Crossing the Street"

Note. Photo taken by D. Dong, a staff member of WoW Education, 2023.

Feedback from Teachers

Two teachers from GuiDeHai Primary School were invited to assist with the activity facilitation. Both

teachers expressed satisfaction with the effectiveness of the board game, noting that students enjoyed the innovative approach and could organize the game on their own, which reduced the burden on teachers while increasing the frequency of students receiving safety education.



Figure 7
Teacher Li from GuiDeHai Primary Practiced Facilitating the Game as the Referee
Note. Photo taken by D. Dong, a staff member of WoW Education, 2023.

Conclusion

This initiative investigated the use of board games as a means of imparting safety education to primary school-aged children in rural China, who face distinct safety challenges. The positive feedback from trial runs has established a robust foundation for expanding its reach and impact. The experience has demonstrated that localizing content is essential for the effectiveness of safety education in rural settings, warranting greater public attention and investment. Through the CTB community platform, the initiative extends an invitation for broader participation in proliferating this program across other rural and ethnically diverse communities, eagerly anticipating the development of more original, localized content and the sharing of ideas to ensure the robust, safe, and informed upbringing of rural children.

In advancing safety education, the "Watch Out Ele!" initiative must further localize content to address specific regional risks, such as children navigating dangerous terrains and playing near unguarded village walls (D. Dong, personal communication, March 23, 2023). Additional game scenarios will cover critical health and emergency responses, inspired by local incidents that underscore the necessity of correct aid techniques to prevent tragedies like those resulting from improper rescue attempts (D. Dong, personal communication, March 23, 2023). To enhance accessibility, the incorporation of Pinyin transcriptions is recommended to support non-Mandarin speakers. These improvements, integrating practical safety measures and language assistance, will better serve the diverse needs of rural students, aligning the educational tool with the lived experiences and challenges of its young users.

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Appendix

Appendix 1. Sample Pre- and Post-Tests Questionnaire

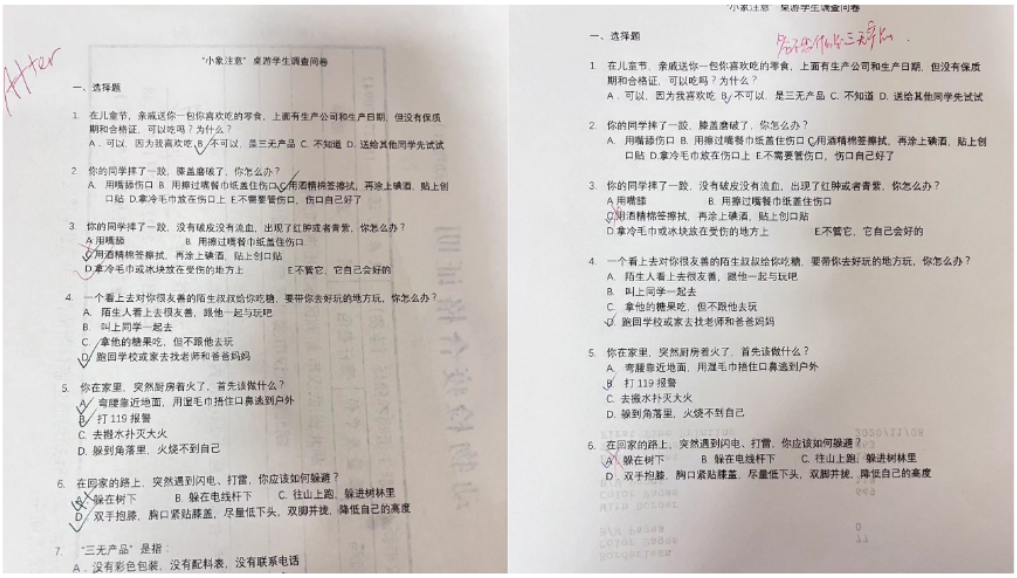


Figure 8

Digital copy of the pre-test (left) and the post-test (right) finished by one student

Appendix 2. Questionnaire for Local Teachers

Dear teachers: hello! We are an innovative initiative working on a safety education program aiming to provide safety education for children more effectively. Our goal is to help them develop a better awareness of safety, protect themselves, and grow up healthily. To assist us in content design, we have prepared a questionnaire that will take approximately 3 minutes to complete. We sincerely appreciate your help!

Do you think the elementary school students you teach need safety education?

A. Yes, they need it.

B. No, they don't need it.

Does the school usually conduct safety education courses or activities?

A. We often organize related courses or activities, providing many opportunities to teach students a lot about safety knowledge.

B. Occasionally, we teach some important safety knowledge to students.

C. There are hardly any opportunities.

In your opinion, what aspects of the current safety education could be

improved?

A. The content doesn't reflect rural life enough and isn't practical in the rural context.

B. The content and pedagogies are relatively old-fashioned, and students have a low level of acceptance.

C. Insufficient time allocated for safety education.

D. No problems.

Do you think your students have sufficient common sense in terms of safety?

A. Yes, they have enough.

B. No, they lack knowledge and need to learn.

Which of the following topics do you think students should learn? (Multiple choices allowed)

A. Food safety

B. Travel and traffic safety

C. Coping with natural disasters like earthquakes

D. Personal hygiene

Which of the following methods do you think are suitable for students to learn about safety? (Multiple choices allowed)

A. Lectures by schoolteachers

B. Education by parents at home

C. Learning through games, reading, and other extracurricular activities

D. Other

If a simple board game accompanied by pictures, cards, and interactive questions was designed to incorporate safety knowledge, allowing students to learn and interact, what would be your attitude towards it?

A. Strongly support it

B. Think it's worth a try

C. Consider it unnecessary

Thank you for your time and valuable input.

Appendix 3. Interview Question for Teachers

Do you usually provide safety education to children now? What method is generally used? How often?

Do you know that when the children in your class are at home, their parents will provide some safety education? What does it usually look like?

Do you think these safety education programs are effective? Have you encountered difficulties in safety education?

What do you think are the main safety risks children face now? For example, drowning, road safety, eating

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the wrong things, etc.? Is there any case that impressed you deeply?

Do you have any other suggestions for rural children on safety education?

How long have you been teaching?

What grades do you mainly teach?

Appendix 4. Game Rule Book

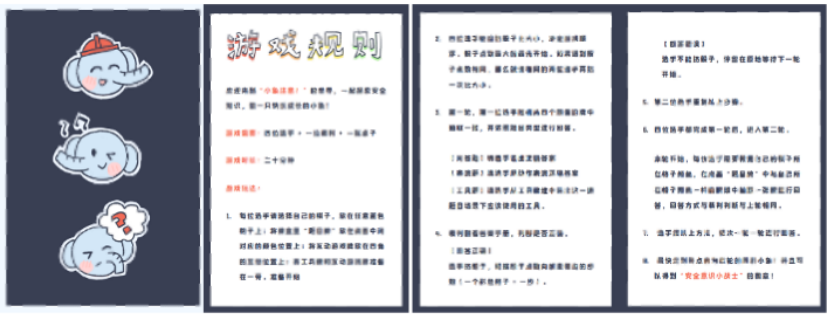


Figure 9

Rule book in Chinese

English Translation:

Game Rule Book

Welcome to the world of "Watch Out! Ele!" Let's explore safety knowledge together and become happy and knowledgeable little elephants!

Players: Four players + One referee + One table

Game Duration: Twenty minutes

Instructions:

1. Each player chooses their game piece and places it on any blue square on the board. Place the "Task Cards" from the card box on the corresponding color positions on the table. Prepare the interactive game cards and prop cards and place them aside. Get ready to start the game.

2. The four players take turns to roll the dice to determine the order to play. The player with the highest dice roll goes first. If multiple players roll the same number, those players will roll the dice again to determine the order.

3. In the first round, the first player randomly selects a card from the four colored decks and answers according to the type of task.

[Q&A Question and Answer Task]: Players need to state the correct answer.

[Performance Task]: Players need to act out the correct answer.

[Equipment Task]: Players need to pick the appropriate prop from the prop card deck for the given scenario.

4. The referee checks the answer in the answer booklet to determine its correctness.
    1. If the answer is correct, the player rolls the dice and moves forward the corresponding number of steps (one colored square = one step).
    2. If the answer is incorrect, the player cannot roll the dice and stays in place until the next round begins.
5. The second player repeats the above steps.
6. After all players have completed the first round, proceed to the second round.
7. In this round, each player needs to draw a card from the deck that matches the color of the square their game piece is on and answer according to the same rules as the previous round.
8. Players take turns answering in rounds, following the same method as described above.
9. The player who reaches the finish line first is the winner of the round and receives the "Safety Awareness Warrior" badge!

Natural Disasters

1. Hold on to floating objects with low density and large volumes, such as boats, logs, doors, and wooden beds.
2. Take shelter indoors under or next to sturdy objects, look for small spaces with structural support.
3. Gas valves and main power switches.
4. Immediately squat down, hug your knees, press your chest against your knees, and lower your head as lightning is most likely to strike the head.
5. Bend over, get close to the ground, cover your mouth and nose in the same way mentioned before, and move to an open outdoor area.
6. Usual animal behaviors, e.g., large livestock refusing to enter enclosures, dogs barking wildly, birds or insects exhibiting abnormal flock migration; household appliances malfunctioning, and strange noise coming from underground.
7. Inhaling fog directly may cause damage to the respiratory system due to the pollutants and microorganisms absorbed by the fog, potentially causing respiratory inflammations such as rhinitis, bronchitis, and pneumonia.
8. On heavily foggy days, try to avoid going outside, close doors and windows to prevent inhaling the fog, and minimize direct exposure to the fog.

Outdoor Safety

1. Cry out for help and attract more people's attention. If the drowning

person is not far from the shore, look in the nearby area for a rope or pole to pull them ashore; you can also tie clothes together into a rope. Assure the drowning person loudly that help is on the way and please remain calm.

2. Do not jaywalk across the road; do not walk side-by-side in a group of three to five people (as doing so leaves little horizontal distance from the traffic); be cautious of oncoming traffic when turning; do not run or play on the road.
3. Run towards home or school, trying to find people you know.
4. Stay away from vehicles. Be aware of blind spots around the corners. Do not walk side-by-side in groups. Avoid chasing and playing around.
5. Try to stay calm and avoid raising your hands. Hold your breath, make your body expand, and let your stomach rise as if you are blowing a balloon. Try to lie on the water's surface, exposing your mouth and nose. Exhale lightly and inhale deeply.
6. Sports shoes.
7. Stay in place and try to contact family members.
8. Leave the high-temperature environment as soon as possible. Move the patient to a shady and well-ventilated area. Lay the patient flat. Use a damp towel to wipe the body or fan the patient to rapidly lower the body temperature.

Health & Emergency

1. Ice cubes, ice water, cold towels.
2. Attach the mask straps behind the ears, and press down on the bridge of the nose to check if the mask edges fit against the face.
3. Iodine, alcohol, band-aids.
4. Do not move or forcibly help the patient get up immediately. Call immediately for adults to handle the situation.
5. If there are towels or clothing available, wet them and cover your mouth and nose. If not, use your hands to cover your mouth and nose.
6. Sit up straight and lean forward. Remain in an upright position to lower the blood pressure in the nasal veins. Pinch the nostrils with the thumb and index finger.
7. No. Cover the area on fire with a damp towel.
8. Find the “bamboo stick” prop card and the “swimming ring” prop card.

Food Safety

1. Pick it up and toss it into the trash. It is no longer edible.
2. Shake your head and say no. Do not take food from strangers.

3. Expired items are not edible and should be discarded.
4. Stay away and do not touch.
5. No, because the food has gone moldy.
6. No date of manufacture, no expiration date, and no quality certificate. No manufacturer. “Three-No" products of questionable quality should not be consumed.
7. No, there are lots of germs.
8. During the growing process, fruits and vegetables can be contaminated with bacteria, viruses, parasite eggs, as well as residues of pesticides and insecticides. They must be thoroughly washed with running water before consumption.