Safe by Design: A Hazard-Control and Risk-Communication Audit of a Grade 9 Cookery Workbook

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Abstract

Food-safety instruction should enable learners to recognize hazards, apply controls, verify conditions, and respond to deviations. This study conducted a risk-oriented document analysis of a 20-page Grade 9 cookery workbook on appetizers. The audit examined personal hygiene, cross-contamination, cleaning and sanitizing chemicals, time-temperature control, storage and packaging, and emergency communication. The workbook appropriately introduces cleaning agents, tool sanitation, illness exclusion, container selection, refrigeration, hair restraints, and several contamination-prevention ideas. It also includes a practical food-preparation task. Nevertheless, its safety messages are mainly labels and general rules rather than operational controls. The chemical lesson names ammonia, chlorine, carbolic acid, disinfectants, soap, and a proprietary sanitizer but does not consistently specify label compliance, food-contact suitability, dilution, contact time, ventilation, personal protective equipment, secure storage, spill response, or the prohibition against mixing products. Cleaning, sanitizing, and disinfecting are not adequately distinguished. Storage instruction defines refrigeration, cold storage, and chilling without measurable temperature limits, thermometer use, date marking, cooling procedures, or corrective action. Cross-contamination receives scattered attention, while allergen communication and traceability are absent. The final rubric does not make food safety a separate critical dimension; presentation can therefore outweigh unsafe process evidence. No safety validation, classroom observation, learner data, or incident record was supplied, so safety competence and instructional effectiveness cannot be inferred. Using the World Health

Organization's Five Keys, Codex hygiene principles, Philippine food-safety law, worker-protection guidance, and the FDA Food Code as review anchors, the article proposes a hazard-control lesson architecture and a stop-correct-document assessment rule. Publication should follow expert review, chemical-label verification, local-policy alignment, usability testing, and monitored pilot implementation.

Keywords: food safety education; chemical safety; risk communication; hazard control; cookery workbook; document analysis

Introduction

A cookery workbook can influence behavior at the moment learners handle knives, chemicals, ready-to-eat foods, and perishable ingredients. Safety content must therefore do more than name a hazard. It should tell the learner what action to take, under what condition, how to verify the action, and what to do when control is lost. Ambiguous or incomplete statements are especially consequential when activities are performed with limited supervision at home.

The World Health Organization organizes core consumer food-safety behavior around five messages: keep clean; separate raw and cooked; cook thoroughly; keep food at safe temperatures; and use safe water and raw materials (World Health Organization, 2006). Codex General Principles of Food Hygiene extends this logic through good hygiene practices, hazard control, monitoring, corrective action, verification, documentation, training, and communication (Codex Alimentarius Commission, 2022). These frameworks make safety observable as a system, not a list of isolated facts.

Philippine law defines food safety as assurance that food will not cause harm when prepared or eaten according to its intended use and calls for science-based standards and controls across the food chain (Republic of the Philippines, 2013). International guidance can help identify content gaps, but local law, school policy, product labels, facilities, and competent authorities remain controlling. The U.S.

FDA Food Code is used in this article as a technical benchmark for food-service controls, not as Philippine law (U.S. Food and Drug Administration, 2023).

The source is a Grade 9 workbook on appetizers developed at Ilocos Sur National High School (Lita, 2023). Its four lessons combine tools, cleaning chemicals, appetizer forms, and storage, followed by a practical task. This article audits the printed safety design. It does not diagnose actual classroom practice, determine regulatory compliance, or attribute unsafe conduct to the author, teacher, or school.

Purpose and Research Questions

The study asked: (1) Which food and chemical hazards are recognized in the workbook? (2) Does each safety message specify an actionable control and a way to verify it? (3) What omissions or ambiguities could create unsafe interpretation during independent use? and (4) What content, assessment, and validation changes are necessary for a risk-informed, publication-ready Grade 9 workbook?

Methods

Design and Corpus

A structured qualitative document analysis was applied to all 20 rendered pages of the workbook. The safety corpus included pretest items, the tool and equipment lesson, the cleaning-compound lesson, the appetizer and canapé lesson, the storage lesson, the performance-task instructions and rubric, and the answer key. Photographs and diagrams were examined when they conveyed a safety-relevant action, container, tool, or chemical.

The unit of analysis was a safety claim, rule, example, assessment prompt, or performance criterion. Repeated statements were coded in context because a rule can function differently as explanation, quiz content, or assessment evidence. The audit did not infer instructions that a teacher might provide orally or that may appear on an original product label.

Risk-Audit Framework

Six domains were used: personal hygiene and health; cross-contamination and safe water or raw materials; cleaning, sanitizing, disinfecting, and chemical handling; time-temperature control; storage, packaging, labeling, and allergens; and emergency or deviation response. For each domain, the review asked whether the workbook identifies the hazard, states a preventive control, defines a measurable limit or label authority where needed, describes monitoring, specifies corrective action, and produces assessable evidence.

A message was classified as operational when it named an action and a verification condition; partial when it offered a general precaution without a limit or check; and absent when a foreseeable control was not addressed. The analysis treated a product label and safety data sheet as authoritative sources for chemical concentration, contact time, compatibility, personal protective equipment, and first aid. It did not invent universal dilution ratios because household and institutional products vary.

Table 1

Risk-Audit Domains and Operational Questions

Domain	Operational question	Required evidence
Personal hygiene and health	What action, at which moment, and under whose supervision?	Observed hygiene sequence and illness decision
Cross-contamination	How are raw, cooked, and ready-to-eat foods separated?	Station map and process observation
Chemicals and sanitation	Which approved product, label condition, contact time, and protection apply?	Label-reading task and monitored procedure
Time-temperature control	What limit applies, how is it measured, and what happens after deviation?	Calibrated measurement and corrective-action record
Storage, labels, and allergens	Is the container suitable, covered, identified, dated, and communicated?	Completed label and storage check
Emergency response	Who stops work, isolates the hazard, and obtains help?	Scenario response and reporting pathway

Procedure and Trustworthiness

The first pass located all safety-relevant content. The second organized statements by the six domains. The third compared them with WHO, Codex, Philippine statutory principles, the FDA Food Code, and worker-protection guidance. The fourth traced safety expectations into the practical task and rubric. A final publication audit checked internal consistency, terminology, sources, and visible accessibility.

One reviewer analyzed one version, so no inter-coder reliability statistic was calculated. External sources were used as review anchors rather than proof of local noncompliance. Risk statements were framed as content-design concerns, and recommendations direct users to current labels, school procedures, and competent local authorities.

Results

Safety Content Strengths

The workbook recognizes several important controls. It asks learners to clean and sanitize tools and equipment, identifies detergents, degreasers, acids, abrasives, and other agents, and notes that food should be handled to prevent contamination and spoilage. It includes illness exclusion, thorough washing of utensils and equipment, reduced hand contact, refrigeration or chilling, and safeguarding food during distribution and service.

The pretest introduces practical situations involving housekeeping practice, knife handling, poison response, dishwashing sequence, cleaning order, and separation of cutting boards. The storage section compares glass, plastic, resealable film, boxes, and paper and acknowledges that container choices have advantages, disadvantages, and possible hazards. The performance task requires a hair restraint and apron and asks learners to document their tools, ingredients, process, and output.

These components provide useful entry points for a coherent safety system. Learners encounter hazards before production, not only after a food product is made. The workbook can therefore be revised without abandoning its four-lesson architecture.

Chemical Safety and Sanitation

The chemical lesson has the highest risk of misinterpretation. It names ammonia, dishwashing liquid, chlorine, carbolic acid, a proprietary sanitizer, disinfectants, and soap. Descriptions focus on what the chemicals are or broadly do, but they do not consistently identify food-contact suitability, label-directed concentration, required contact time, surface compatibility, ventilation, protective equipment, safe storage, or disposal. Learners are not told to avoid transferring chemicals to food containers or to preserve the original label.

Cleaning, sanitizing, and disinfecting are used without a stable distinction. Cleaning removes soil; sanitizing reduces microorganisms on a cleaned surface to an acceptable level; disinfection may use different products or conditions and is not automatically appropriate for food-contact surfaces. The workbook should teach a process such as remove debris, wash, rinse, apply an approved sanitizer according to the label, observe contact time, and air-dry when required. The sequence must be adapted to the surface, product, and local procedure.

The omission of a prominent never-mix rule is critical because both chlorine-containing products and ammonia appear in the same lesson. CDC guidance warns against mixing bleach or disinfectants with other cleaners because dangerous vapors can be released (Centers for Disease Control and Prevention, 2024). Worker guidance likewise emphasizes ventilation, labels, safety data sheets, dilution training, protective equipment, and emergency procedures (Occupational Safety and Health Administration & National Institute for Occupational Safety and Health, 2012). These are essential instructional safeguards, not optional enrichment.

Carbolic acid should not be offered as a routine classroom cleaning choice without an approved, labeled product, a defined use, professional risk assessment, and supervision. A brand name should not stand in for a chemical specification. The safer publishing practice is to teach learners how to read an approved product label and safety data sheet and to use only school-authorized chemicals.

Table 2

Minimum Publishable Content for Chemical-Safety Instruction

Element	Workbook must state or require	Verification
Authorization	Use only school-approved products for the stated surface and purpose	Approved-product list
Label authority	Follow original label and safety data sheet; never guess a dilution	Label interpretation
Compatibility	Never mix bleach/disinfectants with other cleaners, including ammonia	Warning recall and scenario
Exposure control	Provide ventilation and label-specified gloves or eye protection	Pre-use check
Food-contact process	Clean, rinse, sanitize as directed, observe contact time, and air-dry if required	Observed sequence
Storage	Keep closed, labeled, and separate from food; never use food containers	Storage inspection
Deviation	Stop, isolate, notify an adult, and follow local emergency directions	Response simulation

Food Handling, Temperature, and Storage

The workbook's food-handling advice is directionally sound but fragmented. The pretest references separate cutting boards, while the storage lesson calls for proper handling and limited hand contact. However, the lesson sequence does not consistently map raw-to-ready-to-eat flow, handwashing moments, cloth and utensil separation, cleaning between tasks, safe water, or protection of garnishes and other foods served without further cooking.

Refrigeration, cold storage, and chilling are defined without measurable limits. No thermometer is introduced, no method for checking appliance or food temperature is taught, and no corrective action is given for food left outside control. The FDA Food Code uses measurable time-temperature controls, including cold holding at 5°C (41°F) or less for time/temperature control for safety foods (U.S. Food and Drug Administration, 2023). A Philippine school should adopt limits from applicable local requirements and its approved food-safety plan, but the pedagogical principle is transferable: a safety limit must be measurable and connected to action.

Container discussion emphasizes material properties, yet it does not consistently require food-grade condition, intact surfaces, effective covers, separation of chemicals from food, labels, preparation or use-by dates, first-in-first-out rotation, or allergen identification. The final activity allows locally available ingredients, which supports access but makes allergen communication more important. Learners should identify common allergens in the recipe and avoid unverified claims that a product is allergen-free.

The workbook asks learners to safeguard food during distribution and serving, but it does not define transport conditions, service time, utensil control, or discard rules. These gaps matter for appetizers because many are ready-to-eat, handled after cooking, or served cold.

Assessment and Risk Communication

Most safety knowledge is assessed through multiple choice, true/false, matching, or identification. These formats can reveal misconceptions but do not establish that a learner can read a label, prepare a station, prevent cross-contamination, monitor a temperature, or stop an unsafe process. The answer key provides correct options but little explanation, so a learner who chooses incorrectly does not receive a hazard-specific correction.

The performance rubric does not include food safety as a distinct critical criterion. Tool use, ingredient preparation, relevance, procedure, and presentation are scored, but the printed weights total more than 100 and safety breaches are not linked to stop-work action. This permits compensation: strong appearance could offset unsafe handling. For a high-consequence domain, critical controls should be non-compensatory. The learner stops, corrects the hazard if safe to do so, documents the event, and repeats the affected component after feedback.

Risk communication should use direct, action-oriented language. A boxed warning should state that cleaners must never be mixed, chemicals must follow the original label, and only approved products may be used. Temperature instructions should state the locally authorized limit, the measuring device, where and when to measure, and what to do if the limit is missed. Emergency instructions should identify the responsible adult, local emergency procedure, exposure response, and the rule against inducing vomiting unless directed by a competent authority.

Discussion

The workbook contains safety topics but not yet a safety-control architecture. A list tells learners what exists; a control system connects hazard, preventive action, measurable limit, monitoring, correction, verification, and record. Codex places these elements within a food hygiene system and emphasizes that training should match duties and be periodically assessed (Codex Alimentarius Commission, 2022).

The four lessons can be reframed around hazards without losing their accessibility. Tools can be taught through injury prevention and cross-contamination control. Cleaning compounds can be taught through label literacy and the clean-rinse-sanitize-air-dry process. Appetizer classification can include ready-to-eat risk, ingredient allergens, and points of hand contact. Storage can include food-grade containers, covers, labels, safe temperatures, monitoring, and corrective action.

A practical assessment should begin with a pre-operation safety check. During production, the teacher or trained assessor observes critical steps and records deviations. The product is evaluated only after safety release. A short post-task explanation asks the learner to identify hazards, controls, measurements, and corrections. This structure values reasoning as well as compliance and produces evidence that a photograph alone cannot supply.

The WHO Five Keys can function as a learner-friendly organizer, while the detailed operational limits should come from applicable law, school procedure, and manufacturer labels. This layered design avoids both extremes: vague slogans without action and technical rules presented without a memorable structure.

Table 3

Proposed Stop–Correct–Document Safety Assessment

Checkpoint	Examples of critical evidence	If control is missed	Record
Pre-operation	Health check, approved chemicals, clean station, safe tools	Do not start; correct setup	Readiness sheet
Preparation	Hand hygiene, separation, safe tool use, protected ingredients	Stop task; remove or isolate hazard	Observation note
Temperature/ storage	Approved limit, measurement, cover, label, and location	Restore control or discard per policy	Temperature/ storage log
Service	Protected ready-to-eat food, clean utensils, time control, allergen notice	Hold service and correct	Release decision
Close-down	Waste handling, cleaning sequence, chemical storage, reflection	Repeat affected procedure	Corrective-action note

Revision and Validation Priorities

Immediate revision should remove or qualify unsafe generalizations, distinguish cleaning from sanitizing and disinfecting, add never-mix and original-label warnings, and require school-authorized chemicals. Temperature and storage instructions should identify locally approved limits, a thermometer procedure, labeling and rotation, allergen communication, and corrective actions. The practical rubric should be recalculated to 100% and establish critical safety gates.

A food-safety specialist, cookery teacher, chemical-safety officer, and language editor should review the manuscript. Every chemical statement should be traced to a current product label, safety data sheet, or authoritative source. Images should model correct practice and include meaningful alternative text. Emergency directions must align with school policy and local health and emergency services.

Cognitive interviews should test whether learners interpret warnings, temperature language, and cross-contamination scenarios as intended. A supervised pilot should record near misses, stop-work decisions, monitoring accuracy, assessor agreement, and learner explanations. Independent home performance involving chemicals, knives, heat, or perishable food should occur only under an approved risk-control plan with appropriate adult supervision.

Limitations

The audit is limited to one printed workbook and cannot account for oral instruction, demonstrations, available facilities, or local policies. It did not test chemical products, inspect a kitchen, observe behavior, or measure microbiological outcomes. International sources were used as design benchmarks and do not replace Philippine requirements. Product formulations and official guidance can change, so labels, safety data sheets, and competent authorities must be checked at the point of use.

Conclusion

The workbook introduces sanitation, illness exclusion, contamination prevention, refrigeration, containers, and protective clothing, but its messages are usually descriptive rather than operational. Chemical use lacks essential label, never-mix, ventilation, protective-equipment, and emergency safeguards; storage lacks measurable controls; and presentation can overshadow safe process. A publishable revision should use a hazard-control-monitor-correct sequence, make critical controls non-compensatory, provide explanatory feedback, and undergo specialist, accessibility, usability, and supervised field validation.

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