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Needs Analysis for Virtual Reality-based Safety Training in a Commercial Kitchen

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Abstract:- The paper presents the initial analysis of a Training Needs Analysis (TNA) for virtual reality-based safety training of employees within the kitchen industry. Information gathered from the review of existing literature confirms deficiencies in safety training at work, hence eliciting information on employees' ability to identify hazards and understand specific challenges, as well as their need for more effective, relevant, and efficient training, is central to the TNA. To address this, leveraging virtual reality (VR) technology, a versatile tool recognized in education, medicine, and engineering, is proposed for comprehensive hazard training in kitchens. Hence, two-fold questions are: (1) What is the needs analysis in designing a VR-based safety training spotting hazards in the commercial kitchen, and (2) what is the needs analysis in designing the preparation for VR-based safety training in the commercial kitchen? This study employs a Training Needs Analysis (TNA) methodology with 12 participants from diverse roles, including food handlers, occupational safety and health officers (SHO), and IT executives, to assess hazard-spotting practices in commercial kitchens. This study utilized a combination of interviews and on-site observations to assess the current state of hazard awareness and the effectiveness of existing training programs. Limitations include reliance on information from staff who attended food safety training. The study unveils a critical gap in last-minute hazard recognition and a lack of comprehensive occupational safety and health training within the kitchen industry. Findings underscore the urgency for targeted interventions. The proposed solution involves a VR-based training program, offering an immersive experience to enhance hazard awareness. This research contributes valuable insights into the pressing need for innovative training strategies to fortify safety protocols in commercial kitchen workplaces.

Keywords*: Commercial Kitchen, Hazards, Occupational Safety and Health, Training-needs-analysis, Virtual Reality.*

1. Introduction

This study begins with the conduct of a Training Needs Analysis (TNA) to spot hazards in the commercial kitchen for various reasons. It primarily aims to (1) identify gaps in the kitchen employees' hazard recognition skills and comprehension of specific challenges, as well as (2) elicit information on employees' need for enhanced, effective, and efficient work performance via a tailored virtual reality (VR) safety training program. This process not only improves risk mitigation and lowers the chances of accidents and injuries in the kitchen, but also facilitates self-regulation, thus ensuring compliance with regulatory and safety standards. Engaging in an ongoing TNA process

fosters continuous workplace improvement and allows organizations to adapt and optimize safety protocols over time.

Current literature highlights deficiencies in safety training and the need for in-depth knowledge of hazard identification and worker safety (Kabir & Periodique, 2019) in the commercial kitchen. Hospitality venues like restaurants and hotels normally emphasize dining and delivery needs (Khan, 2023), which explains why conventional training programs focus on food safety and tend to neglect broader safety aspects. In addition, the profession's demanding nature often leads to longer work hours, thus heightening employee accident risks among employees (Christopher, 2023). Traditional safety training in hospitality, as noted by (Mensah & Boakye, 2021), may need more depth, particularly in areas that jeopardize worker safety and productivity. It is worth noting that kitchen employees often develop hazard awareness through personal experiences and not training, as they observe accidents face daily challenges, while also noting unsafe practices (Grytnes et al., 2021).

Today's fast-paced nature of the food industry places employees in an even more disadvantaged position. According to (*Occupational Health & Safety*, 2021), time constraints in educating employees on safety, particularly in bustling kitchens mean prioritizing food safety whilst overlooking much-needed safety measures for employees. This report also highlights that companies need help finding time to educate their employees on proper kitchen safety. It has been found that existing safety training in the kitchen focuses only on food safety rather than food handler behavior (Tezel et al., 2021). In addition, Putri and Susanna (2021) empirically proved that food handlers with good knowledge about their work are often neither able to display a positive attitude nor practice proper food handling practices.

To address the widening discrepancy between food and employee safety training, this study proposes leveraging virtual reality (VR) technology for comprehensive hazard training in commercial kitchens. Although recognized as a versatile tool in education, medicine, and engineering training programs (Obukhov et al., 2022), its successful use in the hospitality industry still needs to be proven (Smutný, 2022). VR technology is believed to be one of the contemporary instructional technologies for better training delivery (Paszkiewicz et al., 2021). While traditional safety training methods, such as the classroom type, lack engagement instruction by visual cues and tools, McFarland et al. (2019), these tools make up the very essence of a VR methodology. (Toyoda et al., 2022) advocated a VR-based safety training platform as it emphasizes more immersive learning for kitchen employees. Hence, the initial phase of this study (objective 1) gathers valuable data that will maximize effective safety training focusing on hazard identification in the commercial kitchen and also provides input towards (objective 2) the design preparation of a VR-based safety training program.

2. Literature Review

A. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) introduced by Davis et al. (1989) is used to predict how teachers will react to the introduction of technology in the classroom. According to Ma and Liu (2011), this model is often used in various applications to predict the acceptability of information technology based on perceived ease of use and utility. It gives the conceptual basis for anticipating user attitudes toward technological innovation and the probability cited in most research on technological advancement (Fiorini et al., 2018). Fiorini et al., 2018).

In this study, TAM can support the adaptation of VR technology as a tool for delivering training for kitchen safety. Training with technology happens when people use words (spoken or written text) and pictures (illustrations, photos, animations, or videos) to understand and connect new information with what they already know. This process enables kitchen users to learn more effectively as it increases their chance of remembering information for a long time (Yue et al., 2013). It can also create a more effective and engaging kitchen safety education experience. This experience not only enhances learning but also contributes to improved safety practices in real-world kitchen environments.

B. Training Needs Analysis

TNA is the initial step in the overall training and educational strategy process undertaken by human resource managers of an organization. While the training can assist in expanding workforce skills, the data collection activities through TNA may be influenced by organizational politics due to self-interest, conflict, and power relations (Clarke, 2003). In the case of the kitchen, Ko and Lu (2020) evaluated kitchen staff competency in avoiding food waste using the modified Delphi method and found 58 professional culinary competence indicators divided into four competencies: knowledge, attitude, skills, and problems and difficulties. The study of school kitchens assessed knowledge, attitudes, and practices among food handlers (Da Vitória et al., 2021). Although they found that knowledge level was sufficient, it was much inferior to attitudes and practices regarding some food safety concepts. Compared to food safety, the literature search done thus far could not find any evidence of TNA on Occupational Safety and Health (OSH) in the kitchen.

Nevertheless, kitchen-related literature does highlight industry training to deal with safety issues. According to Yu et al. (2017), insufficient training can cause accidents at work. Clarke (2003) emphasized that safety must improve to prepare future leaders to meet the necessary technical and theoretical knowledge requirements when utilizing technology, skills, and quality in kitchen safety. Yap et al. (2022) emphasized that the tourism industry too, needs to adopt IT in safety training since the adoption of technology for their safety training could be higher. The need for technology adoption, such as utilizing digital technology, can enhance the efficacy of safety training and reduce the occurrence of kitchen accidents. VR is an up-and-coming technology that can improve safety training effectiveness significantly. Other than that, some kitchen safety training in the aviation sector also promotes a safety training culture on mental health and stress management since it can influence human behavior that causes accidents in the kitchen [24]. Safety training in the kitchen has also emphasized the technical aspects of kitchen equipment that require practice. Knowing how tose these could help avoid potential accidents among kitchen staff (Nasir et al., 2022). These are some of the gaps that can be filled by adapting VR technology in safety training in the kitchen. Hence, it is essential to conduct a training analysis to assess and enhance the efficacy of training utilizing VR technology.

C. VR-based Occupational Health and Safety for the Kitchen Workplace

VR technology supports safety training programs by providing realistic simulations with hands-on practices that improve safety knowledge (Tseng et al., 2021). It creates immersive interactive 3D simulations of kitchen environments that can spot hazards by giving information about proper personal hygiene, food preparation, and storage, the use of food thermometers, and cleaning and sanitizing surfaces (Kabir & Periodique, 2019). In the educational context, immersive learning through VR involves tools that enhance user engagement and support collaborative learning (Scavarelli et al., 2020). VR's ability to create lifelike kitchen settings facilitates interactive hazard identification through three-dimensional representation (Kamińska et al., 2019). When developing VR, it is crucial to establish the module's goal, such as replicating real-world events for instructional purposes, incorporating standard training principles, and recognizing hazards or risks (Marougkas et al., 2023).

Types of hazards and potential accidents in the kitchen, based on statistics, should be introduced in occupational training (Cahill et al., 2022). Mejia et al. (2021) stressed the importance of tackling essential elements such as thorough equipment cleaning skills within kitchen training, proposing their integration or recreation within VR for safety training objectives. VR's use in identifying hazards and training for kitchen safety can boost user motivation when working in secure conditions (Yu et al., 2017). The immersive VR experience, mirroring real-world settings, improves learning and enhances safety practices within natural kitchen environments.

3. Methodology

A. Research Design, Population, and Sampling

The choice of a qualitative research methodology is based primarily on the nature of primary data collected for this study. Ugwu and Eze (2023) said Feelings, ideas, and experiences gathered from this study's chosen population help explore and provide insights into the how and why of real-world problems related to the commercial kitchen, valuable information that numerical data gained by a quantitative inquiry (Tenny, 2022) does

not normally reveal. The population included food handlers, safety and health officers (SHOs), and IT executives. The study requires information from experts who not only understand kitchen safety but are also able to relate to others their understanding and experience in kitchen safety with their knowledge of the challenges they have encountered (Mwita, 2022). While SHOs can help identify kitchen safety requirements to prevent hazards, food handlers can help identify the issues and their experience facing hazards in the workplace. According to Corbin and Strauss (2015), as cited in (Sim et al., 2018), the minimum number of participants for the interview is at least five. Additionally, the interview should be for one hour for theoretical saturation to occur as required in grounded theory studies. Moser and Korstjens (2017) suggested at least six participants for phenomenological studies and approximately 30-50 participants for ethnographies and grounded theory studies. This study carefully selected 12 experts with kitchen, SHO, and IT backgrounds.

Table 1: Research Questions and Research Instruments

Research Questions	Research Instrument	Participants
RQ 1: What is the needs analysis in designing a VR-based safety training spotting hazards in the commercial kitchen, and	Semi-structured interview [38]	Safety and health officers Food handlers
RQ 2: What is the needs analysis in designing the preparation for VR-based safety training in the commercial kitchen?		IT executives

However, since this paper only presents the initial findings of the TNA, it will therefore concentrate only on the analysis of Research Questions 1 and 2.

B. Research Instrument, Data Collection and Data Analysis

This study conducted several semi-structured interviews that explore participant's thoughts, feelings, and beliefs about a particular topic. Each interview was guided by a flexible interview protocol and supplemented by follow-up questions, probes and comments that allowed the researcher to obtain open ended data (DeJonckheere & Vaughn, 2019). Questions have been adapted from (Darshan, 2006) and were set prior to the topic and sequence (George, 2023).

As for data collection, this study is follows (DeJonckheere & Vaughn, 2019) in-depth interviews with open-ended questions. Data was collected from 12 experts from March until April 2023 using both face-to-face and online interview platforms. To achieve the first objective, this study gathers valuable data from SHO and food handlers that will maximize effective safety training focusing on hazard identification in the commercial kitchen. As for the second objective, this study provides input from the IT executives towards the design preparation of a VR-based safety training program.

To ensure participants understood the questions, a simple VR tool, Kitchen Safety Virtual Tour: Hazard Identification Training Tools (VT-HiTT) (project registered code: CRLY2022W01820 was used.

Following Braan et. al. a thematic analysis was used to analyze the data according to content, pattern, and theme. An open coding method was used to sort and organize data into categories. The coding is based on a paragraph or sentence.

4. Findings

Table 2 below shows the demographic profile of 12 experts who are participants of the study.

Table 2: Demographic Profile

	Participant	AGE	OCCUPATION	EXPERIENCE
Safety and Health Officer (SHO)/Safety Coordinator				
1	S1	33	Manager	5 years
2	S2	47	Lecturer and SHO	16 years
3	S3	40	Lecturer	15 years
4	S4	40	Safety officer	21 years
Food Handler				
5	P1	22	Chef	3 years
6	P2	28	Chef	8 years
7	P3	44	Chef	21 years
8	P4	48	Lecturer	4 years
IT				
9	IT 1	29	Programmer	4 years
10	IT 2	30	Programmer	3 and ½ years
11	IT 3	29	Lecturer	3 years
12	IT 4	27	Programmer	2 years

Thematic Analysis

This section discussed the study's initial analysis of the TNA in exploring commercial kitchen employees' ability at spotting hazards at work and in gathering information that contributes to the preparation and design of a VR-based safety training program for commercial kitchens. The interview facilitated the acquisition of critical information essential for safety training using a simple VR tool, namely the Kitchen Safety Virtual Tour: Hazard Identification Training Tools (VT-HiTT) (project registered code: CRLY2022W01820). Researchers discovered a few of these needs that could lead them into developing innovative strategies for spotting hazards in the kitchen using a VR-based safety training framework. Responses from all 12 interview participants shared similar views on the themes outlined below. Specifically, eight participants (SHO and food handlers) responded to the first research objective, and the four IT executives responded to the second objective of this study.

The first objective of this study gathers valuable data focusing on hazard identification in the commercial kitchen with four themes yielded; safety knowledge, frequency of safety training, safety culture, and interactive application.

Theme 1: Safety Knowledge

Existing training emphasizes food safety rather than safety at the workplace. The existing safety training has a lacks of relevant and comprehensive content that addresses potential hazards and risks in the kitchen workplace.

Existing training needs to highlight specific safety procedures, potential dangers, and appropriate preventive measures. P1 confirmed this statement: Only food safety was emphasized, there was no focus on worker safety. The Same reaction given by P1: "*Up to this point, our training efforts have focused on imparting knowledge about food safety concerning the general population, to reduce the occurrence of foodborne illnesses."*

S1 further confirms that current training programs include advanced topics such as proper food handling but do not address handling hazards at work. *"I believe that OSH is not given significant focus".*

P2: *The training has also touched on workers' safety but is very general.*

P3: We obtained positive guidance from the Occupational Safety and Health Act. The Act and regulations provide extensive guidance that covers different fields, including construction sites and office work. Furthermore, it included certain kitchen-related information, although it was not thoroughly documented.

Theme 2: Frequency of Safety Training

Safety training should not be a one-time event. Continuous training would expose regular refresher courses and necessary updates to reinforce safety protocols and address any changes in procedures or regulations. However, the workers were given only one training course due to time and budget constraints. This response is from the industry player related to the frequency of training given to the workers in the kitchen.

P4: Indeed, I did participate in the training sessions during the beginning of my employment at KFC. However, that was the only training opportunity I received throughout my seven-year employment. I only participated in the very first training session at QSR Brands Holding, a subsidiary of the KFC corporation. That is the only and last training. Only managers receive further training, while workers do not.

The same goes for P2: I received training only once, and there was no other training session afterwards. (Short of number of training class) attending safety training)

Response from S2: Here, the training is quite simple, consisting of only three days per year; it appears that there is a lack of emphasis on quality. The duration has been reduced from seven days to three days. The possible cause could be attributed to financial limitations. The training over these three days should align closely with the specific responsibilities and tasks outlined in our job description. If we are pursuing a culinary career, it is essential that the training we receive is directly applicable to our field (safety training provided by the management is insufficient).

P4: I took my last training in 2019. It usually covers all aspects in one session if it's about handling courses. It's a one-time thing.

Theme 3: Safety Culture

Existing safety training does not address specific hazards and risks in a particular workplace. Another issue found was when actual safety training did not address specific hazards and risks present in a particular workplace, which is critical to the kitchen user. A generic or one-size-fits-all approach may need to be revised to effectively address the unique safety challenges of a specific environment.

S3: *So far, no specific actions have been taken regarding OSH, except for instances when reports from the Social Security Organization (SOCSO) require attention.*

P1: *The training focuses on the appropriate usage of safety gear, such as safety shoes. Food safety is also incorporated into the training. Regarding food handling, topics included areas like preventing injuries such as cuts, although a higher priority is on ensuring food safety.*

P4*: Yes, there is very little on OSH; it's very little because they only teach the basics, fundamental things* (OSH subjects related to workers' safety are rarely highlighted in training courses).

S2*: safety training is for HIRAC only.*

Theme 4: Interactive Application

The training style is still traditional, which is the classroom type and shows practical application is lacking. Safety training with hands-on practices or simulation training will help participants understand how to apply safety protocols in real-life scenarios. If the training remains theoretical without practical application, it may not be as effective in preparing individuals for safety challenges.

P3: *When it came to the method, it wasn't very interesting, even though there were only 20 to 30 people there at a time. The video needs to be clearer, and the voiceover needs to use a microphone. Even though there wasn't a big crowd, we still couldn't hear him* (the training class environment was not conducive and not interesting to catch the trainees' attention).

S4: *Interactive communication skills refer to the ability to engage in two-way communication, similar to a classroom setting where each lecturer takes on the role of a speaker for the objective of training. The speaker selection process resembles that of a school, when an individual is chosen to assume the role of a safety officer and thereafter takes charge of the responsibilities independently. There is no permanent officer.* (The training is conducted by speakers who are not from SHO).

Usually, the training is conducted using an online platform since it is more convenient in terms of time and budget constraints.

S1 & S2: *Just online training*. (Attending training via online platform)

P1: *I was online too, but all I was doing was listening* (attending training on an online platform).

P2: *The training was conducted online, and it only covered theoretical content* (the training module only provided theoretical content by using an online platform).

As for the second objective, data gathered from IT executives provides input towards the design preparation of a VR-based safety training program. Three themes; inadequate evaluation and feedback, hazard scenarios, and interactive elements were yielded.

Theme 1: Inadequate evaluation and feedback

Evaluation and feedback from the management and the safety officers need to be more efficient. With a proper evaluation and feedback mechanism, it may be easier to assess the effectiveness of the training and make necessary improvements.

P3: *In Malaysia, compliance with the OSH Act and regulations is less rigorous than enforcing food handling matters. If we observe, the health authorities (MOH) are more diligent in their enforcement than OSH. You could ask how often OSH has inspected a building, but it doesn't come up very often in the media.*

You can ask how often OSH has inspected premises, but we rarely hear about it in the media.

S3: *Depending on the case, the Department of Occupational Safety and Health (DOSH) will conduct inspections. Yes, because they must watch many different businesses with a small staff population. They will go there if there is a certain situation, like an accident or some known problem. If the kitchen department makes a report on something but the food and beverage department submits a less comprehensive report, inspection might not happen.*

P2*: For me, it is essential to be vigilant. As I mentioned earlier, the focus is more on food safety. As for other aspects, we must be self-aware. There is no monitoring. Regarding food safety, the Ministry of Health (MOH) conducts inspections at least once a year or every six months, but there is none for general safety.*

P1*: We rely on the Standard Operating Procedures provided (SOPs). Let me show you an example. In these SOPs, we check whether we are following them or not.*

S3: *People in the F & B industry seem to have a problem with 24-hour training. Some are 24 hours, so you can go for training at work as it is the fastest in-house training. But, like me, if it's a semester break, students cannot go for training at that time. If it's not a semester break, sometimes I do not have time to go for training if it is for operation timing.*

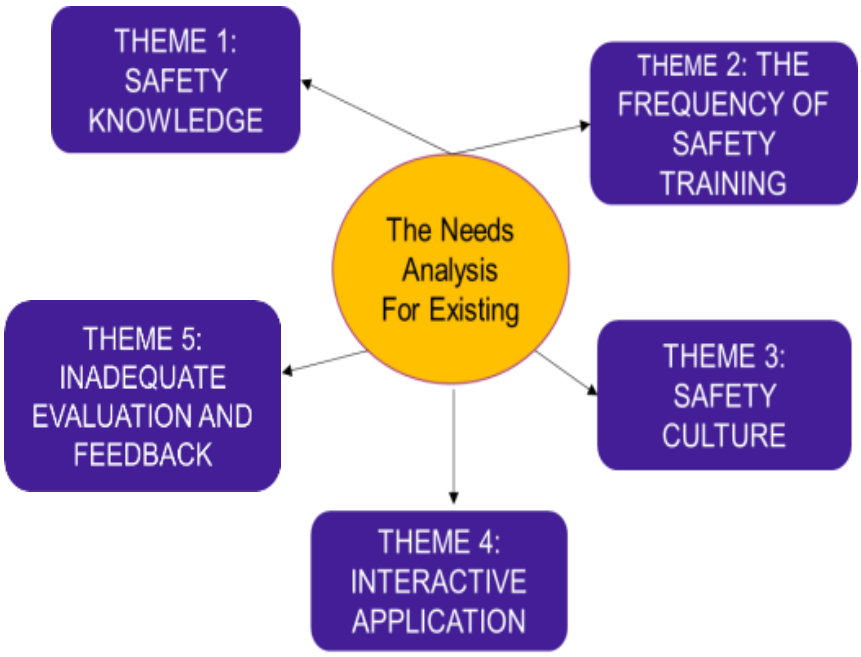

Fig. 2 TNA for Commercial Kitchens

As for the second TNA objective, which focuses on exploring the need to prepare and design VR-based safety training in commercial kitchens, identifying themes like hazard scenarios and interactive elements is crucial. These themes emerge as key components in designing an effective VR-based training program. Figure 2 shows how these themes can be understood and utilized.

Theme 2: Hazard Scenarios

Design realistic kitchen workplace scenarios with potential hazards, such as slippery floors, improper food handling, sharp utensils, and unsafe chemical usage.

IT 1: I don't know much about the kitchen because I don't cook very often, but I can picture things like cutting onions or a floor that is slippery from oil spills. Some acts will not be possible, though, because they need to be programmed. We need to think about the demands and the reasons why some parts are included.

IT 2: It depends on the request if the scene can be created in the developing phase. So, we need recommendations from the experts on what important aspects should be included in the training.

Theme 3: Interactive Elements

IT3: Incorporate interactive elements like sound, videos, and 3D animations to enhance user engagement and understanding of the hazards. Okay, as a designer, their job involves creating 3D models and designing UI elements and other graphics. From a creative perspective, the creation of VR will only be appealing with animations and sound. Adding sound effects and background music to VR will make it more engaging. So, they search for sound effects and background music to achieve that. After all, these three units are part of one team.

IT 4*: Lastly, the interaction. Other than sight, what the user can feel, VR can also be set to give haptic feedback, such as adding vibration and 3D audio, like in gaming style. We can also do that with VR. We can add a score player for evaluation.*

5. Discussion

Safety knowledge is about applying knowledge of occupational health and safety principles, techniques, and practices to biomedical research activities, and to identifying and controlling physical, chemical, biological, and animal hazards (*Occupational Health and Safety Knowledge*, 2023). The OSH level of knowledge in preventing work injuries and diseases is crucial for every employee as it also reflects the effectiveness of OSH training.

Therefore, a moderate level of OSH and a lack of OSH implementation ability at work especially in the hospitality industry (Akhir & Shamsudin, 2019) shows that a gap exists in training.

This can be improved by having a regular and more efficient training system. Safety training frequency is a key factor in accident-free. Training as a one-time event is no longer appropriate since any incident or accident that occurs is more likely due to a lack of adequate training (Huziej, 2023). One-time training led to inadequate time, insufficient resources, and a lack of hands-on training sessions which missed the opportunity to practice the training properly (Yu et al., 2017). Continuous or periodic training sessions may be beneficial in reinforcing safety protocols and practices among employees (McFarland et al., 2019). In addition, continuous training can improve the training content that addresses workplace hazards and exposes the potential hazards concerning the worker's experience effectively.

Continuous training leads to a safety culture development. Recent OSH training found less addressing on workplace hazards and risks and underscores the importance of tailoring occupational safety training programs to the unique workplace environment. Dealing with heat, sharp items, and pressure in the kitchen has led to the need to develop a kitchen safety culture so that the aims to transform the food service into a highly reliable field can be achieved. This is crucial to sustain error-free performance even though operating in hazardous conditions.

However, there is a need for applications to be offered to trainers (Pilbeam & Karanikas, 2023). Pilbeam and Karanikas (2023) Training with hands-on practices can be more accessible for kitchen users. Training depends on applying the training in real situations (Ford et al., 2019). The traditional delivery method has many barriers, such as engagement limitations, difficulty in transferring the training to the real world, time inflexibility, and training inconsistencies due to instructor dependency. Stefan et al. (2023) suggested that there is a training gap between theoretical knowledge and its practical implementation. Incorporating hands-on exercises or simulations into training modules could enhance the applicability of safety protocols in real-life scenarios.

Training can be integrated with digital elements, involving the usage of pictures or video but this requires more technical knowledge and skills which includes knowing more about VR-based training (McFarland et al., 2019). VR is increasingly used to provide highly interactive and contextual learning experiences for food handlers and food safety trainers alike. Immersive VR technologies enable food handlers and safety trainers to experience total immersion and a sense of presence in a simulated environment thus creating 'more difficult to forget' memories.

To make VR-based training an effective training tool, several interactive elements need to be considered. Visuals are highly important as they create near-reality with repeatable scenes involving a user participation ratio (Verhulst et al., 2021). It is in line with the results obtained whereby the informers agree that visuals in VR have brought them into a more accurate and real working environment in the kitchen, which assists them in detecting the common hazards in the kitchen. It proved that VR had developed the mental imagery of the user due to visual-spatial perspectives and immersive information provided in the VR (Ouerghemmi et al., 2023). Skard, et. al. claimed developing mental imagery through VR, with a realistic virtual environment the user may easily understand through their perceived senses. developing mental imagery through VR, with a realistic virtual environment the user may easily understand through their perceived senses.

Engagement with real-world simulation in VR has allowed interactive hazard recognition while allowing trainers to facilitate the trainee's hazard identification by recognizing processes and making decisions within the virtual environment (Ahn et al., 2023). These are heavily dependent on the integration of VR hardware and software as they support system function and stimulate the VR to give an immersive experience to the user (Lyu et al., 2023). Interactive elements like sound, videos, and 3D animations can also be integrated to strengthen user engagement and, as a result, a better understanding of kitchen hazards (Bhatti et al., 2017). Thus, clear and concise instructions and robust evaluation tools measure trainees' responses to hazard scenarios, enabling personalized feedback and performance assessment.

Training without post-training assessment can cause training failure. Regular evaluations and feedback loops can help identify areas for improvement and ensure continuous enhancement of safety measures. According to Omar and Shahril [49], many trainee evaluations are not used to further investigate how to improve kitchen safety among

employees. Designing training evaluation is the platform to measure the effectiveness of training (Kodwani, 2017). This feature reinforces positive behaviors while rectifying errors and facilitating continuous improvement and skill refinement that can help determine the success of the training (Rahmalan, 2020).

Another aspect that will determine the success of the food safety program is giving feedback guidance and evaluating the capacity of individuals to recognize risks. This feature encourages good behavior and simultaneously fixes undesirable behaviors, thus allowing for ongoing improvement (Omar & Shahril, 2019). Alzahran et al. said that without feedback and guidance, mistakes are usually repeated. Proper instructional and evaluation framework tools ensure that the trainees get full training while their work is being evaluated simultaneously. This will also determine the usefulness, accuracy, and acceptability of VR. The evaluation is the most crucial part of training since it identifies issues with the design, the tool, or the way the system works with the hardware (Domingueti et al., 2021).

6. Conclusion

Technology has been rapidly growing and reported to influence training effectiveness. It has been found that VR has a strong potential for helping trainees improve their skills and knowledge by bringing teaching and learning experiences attractively and effectively. The results gained in this needs analysis study have proven that the important elements in VR including visuals, sound, figures, and pictures stimulate informers to understand and spot hazards as well. Hardware and software integration in VR leads to a more immersive learning experience which is crucial for effective training. This study was conducted among safety coordinators in charge of the kitchens understudy only due to the absence of SHOs at these workplaces; hence the findings may not be generalized to the said population. Future studies could consider the use of the Fuzzy Delphi method to confirm the outcomes with the kitchen safety module for culinary programs in TVET institutions.

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