

Enhancing Employee engagement in Occupational Health and Safety Corporate Training via KAHOOT gamified Learning Tool

Ahmed Hosni Tawfik

ID: 2021203006

.....

Final Project - 2

Faculty of Management - Midocean University

Supervisor

Dr. Mona Moustafa Elashry

Faculty member- Faculty of management- Midocean University

2nd Semester – 2024

Acknowledgment

I would like to express my sincere gratitude to all those who have supported me throughout the development and completion of this project.

First and foremost, I am deeply thankful to my supervisor, **Dr. Mona Moustafa Elashry**, for her invaluable guidance, constructive feedback, and continuous encouragement. Her expertise and insight were instrumental in shaping the direction of this research and ensuring its successful completion. Her patience and dedication to my academic growth have been truly inspiring.

I extend my heartfelt thanks to the faculty members at Midocean University for their academic support and for providing a conducive learning environment. Their dedication to education and their willingness to share their knowledge have greatly contributed to my academic growth. Their passion for teaching has motivated me to strive for excellence.

I am also grateful to my colleagues and friends for their moral support, insightful discussions, and helpful suggestions. Their camaraderie and collaboration made this journey a memorable and enriching experience. The shared moments of brainstorming and mutual encouragement have been invaluable.

Special thanks to the **employees** of the ports and terminals in Suez who participated in this study. Their cooperation and honest feedback were crucial to the success of this research. Their willingness to share their experiences and insights has provided a solid foundation for this project.

Lastly, I owe a debt of gratitude to my family for their unwavering support and understanding. Their love and encouragement have been my driving force throughout this academic endeavor. To my parents, for their endless sacrifices and guidance, and to my siblings, for their constant motivation and understanding, I am forever grateful.

Thank you all for your support and belief in my abilities.

Dedication

This project is dedicated to **my family**, whose unwavering support and encouragement have been my anchor throughout this academic journey. To my parents, whose sacrifices and guidance have shaped the person I am today, and to my siblings, for their constant motivation and understanding, your love has been my foundation.

I also dedicate this work to my mentors and educators at Midocean University, especially **Dr. Mona Moustafa Elashry**, for inspiring me to pursue excellence and for providing me with the tools and knowledge to succeed. Your mentorship has been a guiding light in my academic journey.

A special dedication goes to my fiancée, **Asmaa**. Your unwavering support, patience, and love have been a beacon of light throughout this journey. Asmaa, your belief in me has been my greatest motivation. Your encouragement has given me the strength to persevere through the challenges, and your love has made this journey not only possible but profoundly meaningful. Thank you for standing by me with such grace and unwavering faith.

Lastly, this dedication extends to all my friends and colleagues who have been part of this journey, providing companionship, advice, and encouragement along the way. Your support and friendship have made this experience enriching and fulfilling.

Thank you for being my pillars of strength and my sources of inspiration.

Abstract

Purpose:

Methodology:

Findings:

Originality & Implication:

Keywords:

Table of Contents

Acknowledgment	1
Dedication	2
Abstract	3
1. Chapter 1: Introduction.....	5
1.1. Research Problem.....	8
1.1.1. Theoretical Gaps	8
1.1.2. Practical Gaps	8
1.2. Research Significance	9
1.2.1. At the theoretical level	9
1.2.2. At the practical level	10
1.3. Research Questions	10
1.4. Research Objectives	11
1.5. Research Hypotheses.....	11
1.6. Research Model.....	11
1.7. Scope of The Study	12
1.8. The Project Structure.....	13
2. Chapter 2: Literature Review	13
2.1. Introduction	14
2.2. The independent variable	14
2.3. The dependent variable	14
2.4. The relationship between the independent and the dependent variables	14
2.5. Conclusion.....	15
3. Chapter 3: Research Methodology	15
3.1. Introduction	15
3.2. Operational definitions for research variables	16
3.3. Research design (research onion).....	16
3.4. Research population & Sampling methods and technique.....	17
3.5. Data collection method.....	17
3.6. Types of data	18
3.7. Statistical analysis procedures.....	18

3.8. Conclusion.....	19
4. Chapter 4: Statistical Analysis & Findings discussion.....	19
4.1. Introduction	20
4.2. Sample profile (descriptive statistics for research sample).....	20
4.3. Validity & reliability tests for the questionnaires	20
4.4. Descriptive statistics for research variables (answer research questions).....	21
4.5. Testing Hypotheses & Findings Discussion	21
4.6. Conclusion.....	21
5. Chapter five: Research limitations, Recommendations & Conclusion	22
5.1. Research Limitations & Future Research.....	23
5.2. Research Recommendations	23
References.....	24
Appendix.....	26

List of Figures:

List of Tables:

1. Chapter 1: Introduction

Introduction

In recent decades, technological advancements have revolutionized training methodologies across various sectors, including Occupational Health and Safety (OHS). As workplaces evolve, the integration of digital tools to enhance training effectiveness and engagement becomes increasingly imperative. This graduation project explores the utilization of KAHOOT gamified learning tools to elevate employee engagement in OHS corporate training within the context of ports and terminals safety.

Background Information

Occupational safety remains a cornerstone of organizational sustainability and employee well-being. Across industries such as ports and terminals, where operations involve intricate logistics and high-risk activities, maintaining a culture of safety is paramount to mitigate hazards and ensure regulatory compliance (Clarke & Flaherty, 2015). Traditional training approaches often struggle to captivate modern learners or facilitate long-term knowledge retention, prompting a shift towards innovative educational strategies like gamified learning.

Research Problem

Despite the recognized potential of gamified learning to enhance training outcomes, empirical studies specific to its application in OHS within port and terminal environments are scarce. Existing literature predominantly focuses on generic workplace safety contexts, overlooking the nuanced challenges and operational dynamics unique to ports and terminals (Wouters, Paas, & van Merriënboer, 2013). This research aims to fill this gap by investigating how KAHOOT gamified learning tools can effectively engage diverse port and terminal employees in OHS training, thereby fostering a culture of safety and reducing occupational risks.

Objectives

The primary objective of this study is to assess the impact of integrating KAHOOT gamified learning tools on employee engagement levels during OHS corporate training sessions in ports and terminals. Additionally, the research seeks to explore demographic factors—such as age, educational background, and job role—that may influence the reception and effectiveness of gamified learning interventions in this specialized context.

Significance of the Research

This research holds both theoretical and practical significance. Theoretically, it contributes to the evolving discourse on gamified learning interventions by providing empirical insights into their application within high-risk industrial settings. Practically, findings from this study can inform organizational training strategies, equipping port and terminal stakeholders with evidence-based approaches to enhance safety training efficacy and employee participation (Seaborn & Fels, 2015).

Rationale and Importance

The decision to focus on KAHOOT gamified learning tools stems from their proven effectiveness in fostering engagement and knowledge retention in educational settings (Ryan, Rigby, & Przybylski, 2006). By adapting these principles to OHS training, organizations can leverage intrinsic motivational drivers—such as competition and immediate feedback—to cultivate a safety-conscious workforce. This approach not only aligns with global trends towards interactive and personalized learning experiences but also addresses the pressing need for innovative solutions to enhance workplace safety practices worldwide.

Historical Roots and Humanitarian Need

Historically, workplace safety initiatives have evolved from reactive compliance measures to proactive strategies aimed at empowering employees and preventing accidents (Deci & Ryan, 2012). The imperative for this study lies in its potential to advance OHS training methodologies, thereby contributing to broader societal goals of reducing occupational injuries and promoting sustainable development through safer work environments.

Structure of the Introduction

This introduction moves from the general context of technological advancements in training to the specific application of gamified learning in OHS within ports and terminals. Each assertion is supported by relevant literature, establishing a clear linkage between the research problem and existing knowledge gaps in the field.

In summary, this introduction sets the stage for a comprehensive exploration of how KAHOOT gamified learning tools can enhance employee engagement and safety awareness in OHS training within the dynamic and challenging environment of ports and terminals.

1.1. Research Problem

The current research endeavors to explore the integration of KAHOOT gamified Learning Tools in Occupational Health and Safety (OHS) Corporate Training within the context of ports and terminals safety. This investigation is prompted by the growing need for innovative approaches to enhance employee engagement and foster a safety-centric organizational culture in workplaces characterized by diverse occupational risks.

1.1.1. Theoretical Gaps

Despite the expanding interest in gamified learning interventions and their potential impact on OHS training, there exists a notable theoretical gap in understanding the specific nuances and outcomes associated with the integration of KAHOOT within the specialized domain of ports and terminals safety. The current literature provides limited insights into the distinctive factors that influence the efficacy of gamified learning tools in OHS training within this specific industry context.

1.1.2. Practical Gaps

Furthermore, the empirical gaps in the literature are evident in the scarcity of studies that have systematically examined the practical implications, long-term effectiveness, and organizational benefits of utilizing KAHOOT gamified Learning Tools in OHS corporate training for the ports and terminals sector. While preliminary research indicates positive outcomes in generic OHS contexts, there is a clear need for targeted investigations tailored to the unique challenges, occupational hazards, and workforce characteristics prevalent in ports and terminals.

1.1.3. Justification of the Problem:

The significance of addressing this research problem lies in its potential to bridge the existing knowledge gap and provide actionable insights for trainers, practitioners, and organizational leaders within the ports and terminals industry. Effective OHS training is critical for reducing accident rates, ensuring regulatory compliance, and cultivating a safety-conscious workforce. By investigating the integration of KAHOOT gamified Learning Tools, the research aims to contribute practical solutions to the challenges associated with engaging a diverse workforce in safety training programs.

1.1.4. Main Research Question:

Based on the identified theoretical and empirical gaps, the central research question guiding this study is:

"What is the impact of integrating KAHOOT gamified Learning Tools on employee engagement in Occupational Health and Safety Corporate Training within the context of ports and terminals safety?"

1.2. Research Significance

In this section, the student should clarify the importance of the study at the theoretical level, and the empirical level

1.2.1. At the theoretical level

The research endeavors to contribute significantly to the theoretical landscape of occupational health and safety (OHS) training by addressing existing gaps in understanding the efficacy of gamified learning interventions, particularly within the context of ports and terminals safety. By exploring the integration of KAHOOT gamified Learning Tools, the study aims to advance scholarly discourse surrounding innovative pedagogical approaches and their impact on employee engagement and knowledge retention in OHS training programs.

The investigation of KAHOOT's effectiveness in enhancing employee engagement within OHS corporate training represents a novel extension of existing research paradigms. By delving into the intricacies of gamified learning experiences tailored to the unique challenges and occupational hazards prevalent in ports and terminals, the study seeks to broaden theoretical frameworks and refine conceptual models related to workplace safety training methodologies.

Furthermore, the research holds promise in offering theoretical insights into the mechanisms underlying employee motivation, learning outcomes, and behavioral change within the context of gamified learning environments. By elucidating the cognitive, affective, and behavioral processes at play, the study aims to contribute to a deeper understanding of how gamified learning

interventions can be optimized to promote safety consciousness and cultivate a culture of prevention in high-risk work environments.

1.2.2. At the practical level

In addition to its theoretical contributions, the research also holds significant implications for practical application and organizational practice within the ports and terminals industry. By addressing the empirical gap in the literature through rigorous empirical inquiry, the study seeks to provide actionable insights and evidence-based recommendations for enhancing the effectiveness of OHS training programs.

The findings derived from the empirical investigation of KAHOOT gamified Learning Tools have the potential to inform decision-making processes and guide resource allocation strategies within organizations seeking to optimize their safety training initiatives. Through the identification of best practices, challenges, and implementation strategies, the research aims to equip organizational stakeholders with the knowledge and tools necessary to design and deliver engaging, impactful, and sustainable OHS training programs.

Moreover, the empirical significance of the study extends beyond individual organizations to encompass broader societal implications, including the potential for reducing workplace accidents, improving regulatory compliance, and enhancing overall occupational health outcomes within the ports and terminals sector. By fostering a culture of safety rooted in active employee participation and ownership, the research aims to contribute to the creation of safer, healthier, and more resilient work environments that benefit employees, employers, and society at large.

In summary, the research holds both theoretical and empirical significance by advancing scholarly understanding of gamified learning interventions in OHS training and providing practical insights to drive organizational change and promote workplace safety within the ports and terminals industry. Through its dual focus on theoretical refinement and real-world application, the study seeks to catalyze positive transformations in OHS training practices and contribute to the broader discourse on organizational learning, human factors, and safety management.

1.3. Research Questions

Question 1: How does the integration of KAHOOT gamified Learning Tools impact employee engagement levels in Occupational Health and Safety (OHS) Corporate Training within the context of ports and terminals safety?

Question 2: How do demographic factors (e.g., age, educational background, job role) influence the reception and effectiveness of gamified learning interventions in OHS training programs within the ports and terminals industry?

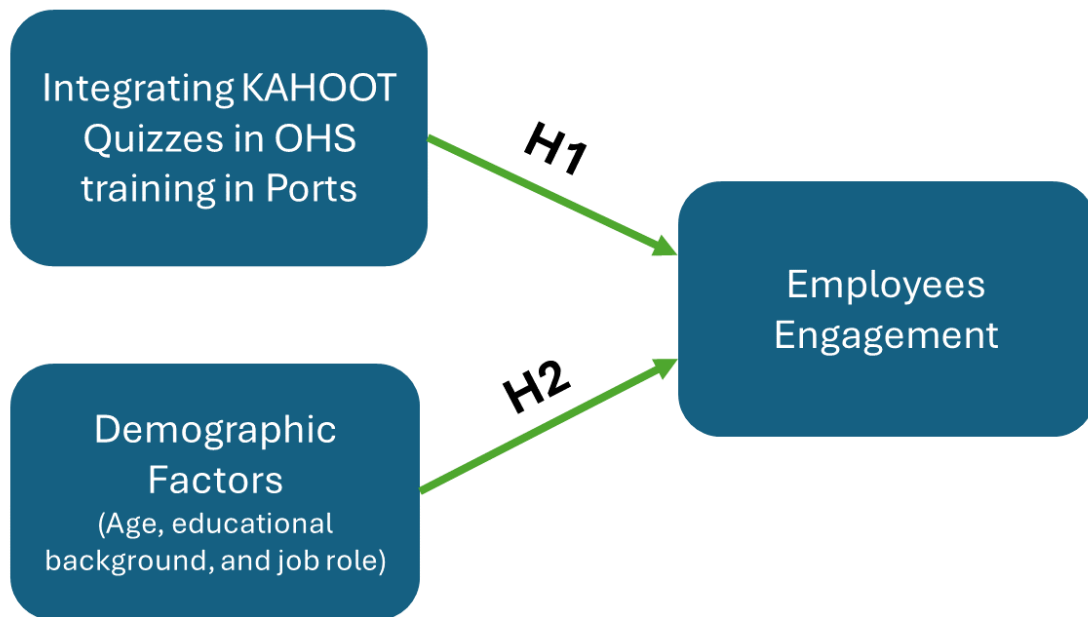
1.4. Research Objectives

1. To assess the impact of integrating KAHOOT gamified Learning Tools on employee engagement levels in Occupational Health and Safety (OHS) Corporate Training within the context of ports and terminals safety.
2. To investigate how demographic factors, such as age, educational background, and job role, influence the reception and effectiveness of gamified learning interventions in OHS training programs within the ports and terminals industry.

1.5. Research Hypotheses

1. Integrating KAHOOT gamified Learning Tools significantly enhances employee engagement levels in Occupational Health and Safety (OHS) Corporate Training within the context of ports and terminals safety.
2. Demographic factors, such as age, educational background, and job role, significantly influence the reception and effectiveness of gamified learning interventions in OHS training programs within the ports and terminals industry.

1.6. Research Model



1.7. Scope of The Study

1.7.1. Geographic Scope

The research will primarily focus on the application of KAHOOT gamified learning tools in Occupational Health and Safety (OHS) corporate training within the context of ports and terminals safety. The study will be conducted in Egypt, specifically targeting ports and terminal facilities located in Suez. This geographic scope ensures relevance to the local industry context while allowing for insights that may be applicable globally to similar high-risk work environments.

1.7.2. Industry Focus

The research will concentrate on the ports and terminals sector, which serves as a critical hub for global trade and transportation. This sector is characterized by diverse occupational hazards and workforce demographics, making it an ideal setting to examine the effectiveness of gamified learning interventions in enhancing OHS training outcomes. By focusing on this industry, the study aims to address sector-specific challenges and opportunities related to safety training and employee engagement.

1.7.3. 1.8.3 Participant Selection

Participants for the empirical study will include a diverse sample of employees working within ports and terminals, encompassing both managerial staff and frontline workers across various job roles (e.g., dockworkers, equipment operators, safety officers). The selection criteria will ensure representation from different age groups, educational backgrounds, and levels of experience within the industry to capture a comprehensive perspective on the reception and effectiveness of KAHOOT gamified learning tools.

1.8. The Project Structure



2.Chapter 2: Literature Review

2.1. Introduction

The landscape of educational and corporate training has undergone significant transformation with the advent of digital technologies, particularly the integration of gamified learning tools. Gamification, defined as the application of game elements and mechanics in non-game contexts, has gained traction for its potential to enhance engagement, motivation, and learning outcomes (Clark & Mayer, 2008). In the realm of occupational health and safety (OHS) training, where ensuring employee compliance and fostering a safety-conscious culture are paramount, the adoption of innovative training methodologies becomes crucial (Becker, 2001).

2.2. The independent variable: Using KAHOOT Gamified Learning Tools

KAHOOT stands out as a leading gamification platform renowned for its interactive features designed to create engaging learning experiences. It employs gamified elements such as quizzes, challenges, and leaderboards to stimulate competition, provide immediate feedback, and promote active participation among learners (Boller, 2012). These features not only enhance the enjoyment of learning but also support knowledge retention by reinforcing learning objectives through interactive simulations and adaptive learning pathways.

2.3. The dependent variable: Employee Engagement in OHS Corporate Training

Employee engagement in OHS training refers to the level of active involvement, motivation, and commitment exhibited by employees towards learning and applying safety practices within their work environment (Becker, 2007). Engaged employees are more likely to adhere to safety protocols, proactively identify hazards, and contribute to a safer workplace culture. This behavioral engagement is crucial for reducing accident rates, improving regulatory compliance, and fostering a culture of safety within organizations.

2.4. The relationship between the independent and the dependent variables

The theoretical underpinning of integrating KAHOOT gamified learning tools in OHS training lies in its ability to enhance employee engagement through intrinsic motivational factors embedded in game mechanics (Clark & Mayer, 2008). Gamification principles, such as points, badges, and leaderboards, tap into individuals' natural desires for achievement, recognition, and competition, thereby motivating them to actively participate in learning activities (Boller, 2012).

Research indicates that gamified learning interventions not only increase motivation but also improve learning outcomes by providing learners with immediate feedback, opportunities for skill mastery, and a sense of accomplishment (Becker, 2001). In the context of OHS training, KAHOOT's gamified elements are expected to foster a deeper understanding of safety procedures, enhance hazard recognition skills, and promote a proactive approach to workplace safety among employees.

2.5. Conclusion

In conclusion, the literature supports the potential of KAHOOT gamified learning tools to revolutionize OHS corporate training by enhancing employee engagement and promoting a culture of safety. While theoretical frameworks provide a robust rationale for adopting gamification in training programs, empirical studies specific to industries like ports and terminals are scarce. Future research should focus on conducting rigorous empirical investigations to validate the effectiveness of KAHOOT in improving OHS training outcomes and its practical implications for enhancing safety culture within high-risk work environments.

3. Chapter 3: Research Methodology

3.1. Introduction

This chapter outlines the methodological framework of the study "Enhancing Employee Engagement in Occupational Health and Safety Corporate Training via KAHOOT Gamified Learning Tools." The methodology includes detailed descriptions of the research design, operational definitions for research variables, research population, sampling methods, data collection methods, types of data, and statistical analysis procedures. The goal is to provide a clear and comprehensive explanation of how the study was conducted to ensure the validity and reliability of the findings.

3.2. Operational definitions for research variables

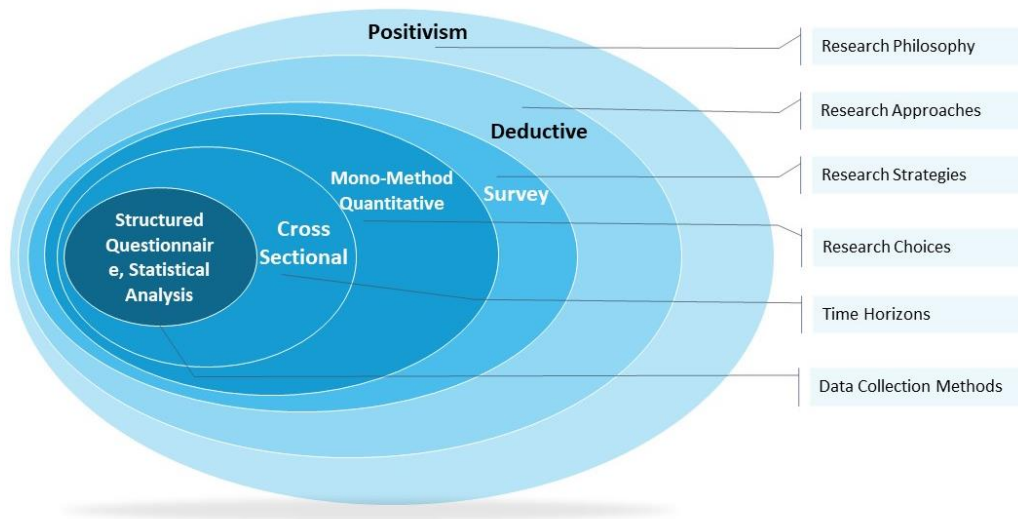
- **Employee Engagement in OHS Training:** This refers to the level of active participation, motivation, and commitment exhibited by employees during Occupational Health and Safety (OHS) training sessions. Engagement can be measured through attendance records, participation in discussions, completion of training activities, and feedback surveys.
- **Gamified Learning Tools (KAHOOT):** Digital platforms that integrate game elements such as quizzes, challenges, points, badges, and leaderboards to create an interactive learning environment. KAHOOT specifically uses multiple-choice quizzes that are played in real-time, encouraging competition and immediate feedback.
- **Demographic Factors:** Characteristics of the study participants, including age, educational background, job role, and years of experience. These factors are considered to determine their potential influence on the effectiveness of gamified learning tools.

3.3. Research design (research onion)

The research design follows the "**research onion**" framework, which systematically layers various aspects of research methodology:

1. **Philosophy:** The study adopts a positivist philosophy, which holds that knowledge is based on observable phenomena and can be measured objectively. This approach is suitable for testing hypotheses and deriving conclusions from statistical analysis.
2. **Approach:** A deductive approach is used, starting with existing theories on gamified learning and employee engagement. Hypotheses are formulated based on these theories and tested through empirical research.
3. **Strategies:** A survey strategy is employed to gather data from a large number of respondents efficiently. Surveys are appropriate for collecting standardized data that can be quantified and analyzed statistically.
4. **Choices:** A mono-method quantitative approach is selected, focusing solely on numerical data collected through structured questionnaires. This method allows for precise measurement and statistical testing.
5. **Time Horizon:** The study is cross-sectional, capturing data at a single point in time. This approach provides a snapshot of the current state of employee engagement and the impact of gamified learning tools.

6. **Techniques and Procedures:** The primary technique involves administering a structured questionnaire. Procedures include selecting the sample, distributing the survey, collecting responses, and performing statistical analysis.



3.4. Research population & Sampling methods and technique

- **Research Population:** The target population consists of employees working in ports and terminals in Suez, Egypt. This includes a diverse range of roles such as managerial staff, frontline workers, safety officers, and equipment operators. The population is chosen due to the high-risk nature of the work environment, making effective OHS training crucial.
- **Sampling Method:** A stratified random sampling technique is employed. This method involves dividing the population into subgroups (strata) based on demographic factors such as job role, age, and educational background. Random samples are then drawn from each stratum to ensure representativeness.
- **Sample Size:** The sample size is determined using statistical power analysis, aiming for a size of approximately 200 employees. This number is chosen to ensure statistical significance and the ability to generalize findings to the broader population.

3.5. Data collection method

Data is collected using a structured questionnaire, which is divided into four sections:

1. **Demographic Information:** This section gathers basic information about the participants, including age, gender, educational background, job role, and years of experience.
2. **Current Engagement in OHS Training:** This section assesses participants' current involvement in OHS training programs, including the frequency of participation and their self-reported level of engagement.
3. **Perception of Gamified Learning Tools (KAHOOT):** This section explores participants' previous experience with KAHOOT, their perceived level of engagement, and their opinions on the effectiveness of gamified learning tools in OHS training.
4. **Impact on Engagement and Learning Outcomes:** This section evaluates the effect of KAHOOT on participants' motivation to engage in OHS training, their retention of training content, and their likelihood to recommend gamified training methods to colleagues.

The questionnaire is designed to be easy to understand and quick to complete, taking approximately 10-15 minutes. It is distributed both electronically and in paper format to accommodate different preferences and ensure a high response rate.

3.6. Types of data

- **Primary Data:** This is the main source of data for the study, collected directly from participants through the structured questionnaire. It includes quantitative responses to closed-ended questions.
- **Quantitative Data:** The data collected is numerical, enabling statistical analysis. It includes measures of engagement levels, demographic variables, and perceptions of gamified learning tools.

3.7. Statistical analysis procedures

- **Descriptive Statistics:** These are used to summarize and describe the main features of the collected data. Measures such as mean, median, mode, standard deviation, and frequency distribution are calculated to provide an overview of the sample characteristics and engagement levels.
- **Reliability and Validity Tests:** Reliability tests, such as Cronbach's alpha, are conducted to assess the internal consistency of the questionnaire items. Validity tests ensure that the questionnaire accurately measures the constructs it is intended to measure.
- **Inferential Statistics:** Hypotheses are tested using various statistical methods. Regression analysis is used to examine the relationship between the use of KAHOOT and employee

engagement. Analysis of Variance (ANOVA) and t-tests are employed to compare engagement levels across different demographic groups. These tests help determine the significance of the findings and their generalizability.

- **Correlation Analysis:** Pearson's correlation coefficient is calculated to identify the strength and direction of relationships between variables, such as the correlation between engagement levels and demographic factors.

3.8. Conclusion

This chapter provided a detailed outline of the research methodology employed in the study. It covered the research design, operational definitions, research population, sampling methods, data collection methods, types of data, and statistical analysis procedures. The methodology is designed to ensure the collection of reliable and valid data, enabling robust analysis and meaningful conclusions. The next chapter will present the results of the statistical analysis and discuss the findings in relation to the research objectives and hypotheses.

4. Chapter 4: Statistical Analysis & Findings discussion

4.1. Introduction

4.2. Sample profile (descriptive statistics for research sample)

4.3. Validity & reliability tests for the questionnaires

4.4. Descriptive statistics for research variables (answer research questions)

4.5. Testing Hypotheses & Findings Discussion

4.6. Conclusion

5. Chapter five: Research limitations, Recommendations & Conclusion

5.1. Research Limitations & Future Research

5.2. Research Recommendations

5.3. Conclusion

References

- Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International*, 13(3), 209-223.
- Burke, M. J., Sarpy, S. A., Smith-Crowe, K., Chan-Serafin, S., Salvador, R. O., & Islam, G. (2006). Relative effectiveness of worker safety and health training methods. *American Journal of Public Health*, 96(2), 315-324.
- Chi, M. T. H. (2009). Active-constructive-interactive: A conceptual framework for differentiating learning activities. *Topics in Cognitive Science*, 1(1), 73-105.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification". In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments* (pp. 9-15).
- Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. *International Journal of Educational Technology in Higher Education*, 14(1), 9.
- Domínguez, A., Saenz-de-Navarrete, J., De-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J. J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, 63, 380-392.
- Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, 33(4), 441-467.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?--a literature review of empirical studies on gamification. In *2014 47th Hawaii International Conference on System Sciences* (pp. 3025-3034). Ieee.
- Hew, K. F., Huang, B., Chu, K. W. S., & Chiu, D. K. W. (2020). Engaging Asian students through game mechanics: Findings from two experiment studies. *Computers & Education*, 149, 103811.
- Ismail, M. A. A., & Mohammad, J. A. M. (2017). Kahoot: A promising tool for formative assessment in medical education. *Education in Medicine Journal*, 9(2), 19-26.
- Johnson, D., Deterding, S., Kuhn, K. A., Staneva, A., Stoyanov, S., & Hides, L. (2016). Gamification for health and wellbeing: A systematic review of the literature. *Internet Interventions*, 6, 89-106.
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, 33(4), 692-724.

- Knowles, M. S., Holton, E. F., & Swanson, R. A. (2015). *The Adult Learner: The definitive classic in adult education and human resource development*. Routledge.
- Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' perception of Kahoot!'s influence on teaching and learning. *Research and Practice in Technology Enhanced Learning*, 13(1), 9.
- Plump, C. M., & LaRosa, J. (2017). Using Kahoot! in the classroom to create engagement and active learning: A game-based technology solution for eLearning novices. *Management Teaching Review*, 2(2), 151-158.
- Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon*, 9(5), 1-6.
- Robinson, D., Perryman, S., & Hayday, S. (2004). The Drivers of Employee Engagement. *Report-Institute for Employment Studies*.
- Robson, L. S., Stephenson, C. M., Schulte, P. A., Amick, B. C., Chan, S., Bielecky, A. R., ... & Grubb, P. L. (2012). A systematic review of the effectiveness of occupational health and safety training. *Scandinavian Journal of Work, Environment & Health*, 193-208.
- Sailer, M., Hense, J., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior*, 69, 371-380.
- Wang, A. I., & Lieberoth, A. (2016). The effect of points and audio on concentration, engagement, enjoyment, learning, motivation, and classroom dynamics using Kahoot!. In *Proceedings from the 10th European Conference of Game Based Learning* (pp. 737-746).
- Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning—A literature review. *Computers & Education*, 149, 103818.
- Zarzycka-Piskorz, E. (2016). Kahoot it or not? Can games be motivating in learning grammar? *Teaching English with Technology*, 16(3), 17-36.
- Boller, S. (2012, October 20). Game based learning: Why does it work? BLP News - Lessons on Learning Blog. Retrieved from http://www.bottomlineperformance.com/gamebasedlearning/#_edn2
- Becker, K. (2007). Digital game-based learning once removed: Teaching teachers. *British Journal of Educational Technology*, 38(3), 478-488. doi: 10.1111/j.1467-8535.2007.00711.x
- Becker, K. (2001). Teaching with games: The minesweeper and asteroids experience. *Journal of Computing in Small Colleges*, 17(2), 23-33.
- Clark, R. & Mayer, R. (2008). ***eLearning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning***. San Francisco, CA: Pfeiffer.

Appendix

Appendix 1: Questionnaire

Dear Participant,

We are conducting a research study titled "Enhancing Employee Engagement in Occupational Health and Safety Corporate Training via KAHOOT Gamified Learning Tools" The primary goal of this study is to investigate the impact of integrating gamified learning tools, specifically KAHOOT, on employee engagement and learning outcomes in Occupational Health and Safety (OHS) training within the context of ports and terminals safety.

Purpose of the Study: The purpose of this study is to enhance our understanding of how gamified learning interventions can improve engagement and effectiveness in OHS training. Additionally, we aim to explore how demographic factors such as age, educational background, and job role influence the reception and effectiveness of these tools.

Why Your Participation Matters: Your participation is crucial to the success of this study. By sharing your experiences and perceptions, you will help us gain valuable insights into the effectiveness of gamified learning tools in OHS training. This, in turn, will enable us to make informed recommendations for improving training programs and enhancing workplace safety.

Confidentiality: Please be assured that all information you provide will be kept strictly confidential and will be used solely for the purposes of this research. Your responses will be anonymized, and no identifying information will be linked to your answers.

Instructions: The questionnaire is divided into **Four sections:**

- Demographic Information - This section collects basic information about your background.

- **Current Engagement in OHS Training** - This section assesses your current level of engagement in OHS training.
- **Perception of Gamified Learning Tools (KAHOOT)** - This section gathers your views on the use of KAHOOT in training.
- **Impact on Engagement and Learning Outcomes** - This section evaluates the impact of KAHOOT on your motivation and knowledge retention.

The questionnaire should take approximately 10-15 minutes to complete. Your honest and thoughtful responses are greatly appreciated.

Consent: By proceeding with this questionnaire, you consent to participate in this study voluntarily and understand that you may withdraw at any time without penalty.

Thank you for your time and valuable contribution to this research.

Section 1: Demographic Information

Question	Options
1. Age:	Under 25 - 25-34 - 35-44 - 45-54 - 55 and above
2. Gender:	Male - Female
3. Educational Background:	High school diploma - Associate degree - Bachelor's degree - Master's degree - Doctorate - Other
4. Job Role:	Blue-collar worker - White-collar worker - Manager/Supervisor - Executive - Other
5. Years of Experience in Current Role:	Less than 1 year - 1-3 years - 4-6 years - 7-10 years - More than 10 years

Section 2: Current Engagement in OHS Training

Question	Options
1. How often do you participate in Occupational Health and Safety (OHS) training?	Never - Rarely (Once a year or less) - Occasionally (2-3 times a year) - Frequently (4-6 times a year) - Very Frequently (More than 6 times a year)
2. How would you rate your current level of engagement in OHS training sessions?	Very Low - Low - Moderate - High - Very High

Section 3: Perception of Gamified Learning Tools (KAHOOT)

Question	Options
1. Have you ever used KAHOOT in any training or educational setting?	Yes - No
2. If yes, how would you rate your experience with KAHOOT in terms of engagement?	Very Poor - Poor - Average - Good - Excellent
3. How do you perceive the integration of gamified tools like KAHOOT in OHS training?	Strongly Negative - Negative - Neutral - Positive - Strongly Positive
4. Do you believe that using KAHOOT can enhance your engagement in OHS training?	Strongly Disagree - Disagree - Neutral - Agree - Strongly Agree

Section 4: Impact on Engagement and Learning Outcomes

Question	Options
1. How motivated are you to participate in OHS training when gamified tools like KAHOOT are used?	Not Motivated at All - Slightly Motivated - Moderately Motivated - Highly Motivated - Extremely Motivated
2. Do you feel that KAHOOT helps in better retention of OHS training content?	Strongly Disagree - Disagree - Neutral - Agree - Strongly Agree
3. How likely are you to recommend KAHOOT-based OHS training to your colleagues?	Very Unlikely - Unlikely - Neutral - Likely - Very Likely

Questionnaire Link: <https://forms.gle/Bct2jyxC2qPBBibv6>

Research Instruments:

Variable	Variable Dimensions	Number of Statements	Source
Employee Engagement in OHS Training	- Frequency of Participation - Level of Engagement - Motivation	5	Developed for the study based on literature review
Perception of Gamified Learning Tools (KAHOOT)	- Previous Experience - Engagement Level - Perceived Effectiveness	6	Developed for the study based on literature review

Variable	Variable Dimensions	Number of Statements	Source
Impact on Engagement and Learning Outcomes	- Motivation to Participate - Content Retention - Likelihood to Recommend	6	Developed for the study based on literature review
Demographic Factors	- Age - Gender - Educational Background - Job Role - Years of Experience	5	Standard demographic questions for survey research