From Complexity to Clarity: Maximizing Training Effectiveness in Reducing Information Overload through Graphic Recording

by

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ABSTRACT

The escalating demands for continuous learning have given rise to a paradox: the more training individuals undergo, the less effective it becomes due to the pervasive issue of information overload. This dilemma not only impedes learning retention and application but also stunts personal and professional development. In response to this challenge, graphic recording has emerged as a promising remedy to alleviate information overload. However, it contends with the perception of being a mere novelty rather than a substantive learning tool. This paper examines whether graphic recording can enhance trainees' comprehension and engagement, contributing to more effective training outcomes. Using an experimental design, 100 participants are divided into two groups undergoing training with and without graphic recording for comparison. Post-training examinations and surveys were used to assess learning acquisition and participant engagement. The findings underscore the significant efficacy of graphic recording in reducing information overload while simultaneously enhancing engagement and learning acquisition. These results offer valuable insights for training professionals and organizations grappling with the challenges posed by information overload. Moreover, they hold the promise of transforming training into a more fruitful and captivating experience, ultimately fostering enhanced training outcomes.

Keywords: Graphic recording, training effectiveness, information overload

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CHAPTER I INTRODUCTION

This chapter provides the foundational context for the current study. It explores the demands for continuous learning in modern society and the paradoxical challenge posed by information overload, which hampers training effectiveness. Additionally, it introduces graphic recording as a potential solution to reduce this issue. The chapter outlines the objectives and significance of the study, setting the stage for the subsequent exploration of the research questions and hypotheses.

Background of the Study

In today's rapidly evolving business environment, every organization, regardless of type or size, recognizes the essential role of training in equipping employees with the knowledge and skills required to excel in their roles. Whether it's onboarding new hires or ensuring that existing staff remain up-to-date with the latest developments, training programs have become an integral part of the corporate landscape (Blume et al., 2009; Dermol & Cater, 2013; Kaban & Amanda, 2022).

Training, however, often comes at a significant cost to organizations. It involves not only the direct financial expenses of designing and delivering training programs but also the indirect costs associated with time or off-duty. As such, organizations have to ensure that their investments in training yield a positive return. This means the purpose of training aims to let employees not only possess higher skill levels but also apply those skills more effectively in their roles which helps contribute to the organization's overall success and competitiveness (Barrett & O'Connell, 2001; Ford et al., 2011; Jonny, 2016; Satiman et al., 2015; Singh, 2017). According to the Training Magazine (2022), Training Industry Report, training expenditures in the United States have exceeded $100 billion which has been greatly influenced by the COVID-19 pandemic, particularly to upskill the use of technology. Empirically, the continual evolution of training practices has changed tremendously

throughout the decades to undergo significant changes and adaptations to align with emerging trends and transformations in the workplace and society (Hristov & Arcelus-Ulibarrena, 2023; Salas & Cannon-Bowers, 2001).

Notably, researchers have found that less than 10% of training and development expenses (Brown, 2005) and skills (Aik & Tway, 2005) are effectively applied by employees within their workplace (Ford et al., 2011). While training is undeniably a cornerstone of development for both individual learners and the organizations they serve, within this positive narrative, employees frequently find themselves grappling with the challenges of learning "too much" (Alken et al., 2018; Bafaneli & Setibi, 2015; Cawley, 2020 Gibbons, 1991; Obmiński, 2016). In the era of information abundance, employees occasionally confront a dilemma where the volume of training content overwhelms their cognitive capacities. The term "information overload" resonates deeply with those who have navigated the complex terrain of modern training programs (Kidd, 2021; Rio, 2019; Yurynets & Khavura, 2021; Yu et al., 2023). The path from complexity to clarity often appears obscured as they struggle to process, remember, and apply the knowledge acquired during training. A study conducted by the University of Northern Colorado and Grannis Group revealed that 53 percent of salespeople said they are always overwhelmed with too much information leaving them confused about the product and cannot close the deal with the customers (Grannis, 2020).

Knowledge is a continuous and ongoing process. The conventional training as a singular, one-and-done event is gradually being replaced (Donnell, 2018) with smaller sessions but longer times (Ismael, 2020; Woolsey, 2017). Indeed, as we embark on the journey of continuous learning, the preservation of knowledge over time has become a challenge. Unfortunately, what is hard to learn is hard to forget (Ismael, 2020). According to the widely accepted forgetting curve theory by Hermann Ebbinghaus in 1885 illuminated that

human tends to forget 90 percent of the knowledge acquired during training within a week. This revelation prompts us to question the efficacy of training programs and the strategies employed to manage the vast information that characterizes modern learning environments.

Recognizing this challenge, trainers and organizations have been diligently seeking innovative methods to enhance training effectiveness. One approach that has garnered considerable attention in recent years is the use of graphic recording (Agerbeck, 2012; Larkin, 2023). This method involves capturing and presenting information visually, typically in real-time, and distilling complex topics into concise, engaging, and easily digestible one-page summaries. Graphic recording holds the potential to address the issue of information overload by leveraging and transforming dense information into visually appealing representations that facilitate comprehension and retention (Dean-Coffey, 2013; Sandholdt et al., 2022).

Previously, a number of researchers and educators were trying to encourage individuals to do 'visual note-taking' as a compelling alternative to the conventional, text-heavy approach. This engaging activity promises to make the absorption of knowledge more enjoyable, memorable, and interactive (Arzaga, 2023; Dimeo, 2021; Fernández-Fontecha et al., 2018; Lewis & Sturdee, 2023; Liu et al., 2023). However, there are limitations to the misconception that one must possess exceptional artistic talent to effectively engage in visual note-taking, which is not true – as Mike Rohde (2012), the one who invented the word 'Sketchnoting', said "Ideas, not Art". Visual note-taking is not about creating aesthetically pleasing artwork, but effectively capturing and representing the content. Nevertheless, the dynamic nature of training sessions might require participants to do activities or site visits which can make it hard for everyone to maintain their concentration in taking notes. More importantly, not to mention that not every trainee is eagerly motivated by the training in the first place (Nikandrou et al., 2009). That is why organizations are hiring graphic recorders —

a distinct group of professionals equipped with the skill to transform training content into visual masterpieces in real-time to do this job for trainees and to help assist the trainer as a live visual aid as well (Ink Factory, 2023).

Nevertheless, while the potential of graphic recording in alleviating information overload is captivating, it is crucial to verify its actual impact on trainee engagement, learning outcomes, and knowledge acquisition. The question that emerges is whether graphic recording genuinely enhances the training experience, or if it is perceived merely as a captivating display. As trainees may captivated by the artistic aspect of graphic recording, sometimes overshadowing their focus on the substantive content of the training (Haugh & Macfarlan, 2020; Larkin, 2023; Lopatovska et al., 2016). Moreover, the talents of graphic recorders, while remarkable, have elevated their fees, up to $4,500 per day (Kingman Ink, 2023), to a level that raises concerns among trainers (Huang, 2017). This multifaceted scenario sets the stage for our inquiry.

In light of these dynamics, this research aims to explore the effectiveness of graphic recording as a transformative tool within the training landscape. By utilizing Kirkpatrick's framework (1959), this study seeks to examine the effect of graphic recording on both trainee reactions (Level 1) and learning outcomes (Level 2). The central question revolves around whether the introduction of graphic recording significantly influences these facets in comparison to training sessions conducted without this visual enhancement. The study aims to offer valuable insights into the use of graphic recording as a tool for maximizing training effectiveness while reducing the burden of information overload. Through rigorous experimentation and analysis, it could represent a critical step in discerning the intricate role of graphic recording and its potential to transcend the boundaries of visual entertainment, making an indelible impact on the efficacy of training programs.

Statement of the Problem

The demands for continuous learning and training have grown tremendously with today's information surge, reflecting a critical need for individuals and organizations to adapt and acquire new knowledge and skills. However, a paradox has emerged in this context: the more training individuals engage in, the less effective it becomes due to a pervasive issue known as "information overload" (Alken et al., 2018; Bafaneli & Setibi, 2015; Cawley, 2020; Gibbons, 1991; Kidd, 2021; Obmiński, 2016). The abundance of information often leads to a situation where learners struggle to retain and apply the knowledge acquired during training, thus hindering their growth and development. To encompass vast quantities of data, and, regrettably, may lead to information overload, a phenomenon where trainees are overwhelmed by the amount of information presented to them. As a result, many individuals participating in training sessions may find themselves fatigued, struggling to absorb and retain all the concepts, and ultimately unable to accomplish the training goal (Kidd, 2021; Rio, 2019; Yurynets & Khavura, 2021; Yu et al., 2023).

In response to this challenge, graphic recording has emerged as a promising solution (Agerbeck, 2012; Larkin, 2023), offering the potential to alleviate the effects of information overload (Dean-Coffey, 2013; Sandholdt et al., 2022). While initially introduced with the intent of enhancing learning and training experiences, the graphic recording has, over time, transitioned into a tool viewed by many as a mere novelty, primarily aimed at enhancing the entertainment factor of conferences and events. Participants find amusement in observing the artistic aspect of graphic recording rather than focusing on the content and context of the training (Haugh & Macfarlan, 2020; Larkin, 2023; Lopatovska et al., 2016). The scarcity of skilled graphic recorders, coupled with their relatively high fees (Huang, 2017), presents additional challenges. Furthermore, there is a notable perspective among some training

participants that they need not actively engage in training activities, believing they can access the information at a later time.

In light of these complexities and divergent perceptions, this paper seeks to address the issue at its core. It aspires to investigate the audience's perspective on graphic recording, specifically within the context of Kirkpatrick's Levels 1 and 2, which assesses the participants' reactions and learning. The central inquiry revolves around whether graphic recording can genuinely enhance the comprehension and engagement of trainees and thereby contribute to more effective training outcomes.

This research aims to experiment on the relationship of information management in training, the evolving role of graphic recording, and its impact on the participants' learning experiences, all within the context of a world brimming with information. By addressing this multifaceted problem, this study endeavors to provide valuable insights and guidance for training and development professionals, organizations, and graphic recorders seeking to optimize the training process and enhance its effectiveness in a world defined by the challenges of information overload.

Purposes of the Study

The primary objective of this comprehensive experimental research is to explore the relationship between information overload, the innovative practice of graphic recording, and the multifaceted constructs of Kirkpatrick's training effectiveness evaluation model. This investigation unfolds across four research objectives.

First, the study seeks to unveil the profound impact of information overload on the initial level of Kirkpatrick's framework, focusing on the aspect of reaction (Level 1). It delves into whether information overload significantly influences the immediate responses and perceptions of trainees to training experiences, thus offering insights into the complex

dynamics of learning engagement. Secondly, the research aims to assess the potential influence of information overload on the aspects of Kirkpatrick's learning (Level 2) to find the profound implications of information saturation on the depth of acquired knowledge.

For the third and fourth purposes of this study, the research ventures into the moderation effect of graphic recording for the relationship between information overload and Kirkpatrick's Levels 1 and 2. This exploration seeks to determine how a visual and real-time tool, may alleviate or enhance trainee responses to training experiences in the face of information overload and impact the depth and sustainability of the knowledge and competencies in participants.

This study endeavors to contribute valuable insights to the field of training and development that may enhance the transformative potential of innovative training practices in a world that is characterized by ever-expanding knowledge and complex learning environments.

Questions of the Study

The primary objective of this study is to gain a comprehensive understanding of the interconnections among information overload, training effectiveness, and the application of graphic recording as a potential moderating factor. To achieve this aim, four key research questions have been formulated:

1. Will information overload negatively impact the trainees' reactions, and reduce Kirkpatrick’s training effectiveness Level 1?
2. Will information overload negatively impact the trainees' learning, and reduce Kirkpatrick’s training effectiveness Level 2?
3. Can graphic recordings serve as a moderator, alleviating the negative impact of information overload on the trainees' reactions?

4. Can graphic recordings serve as a moderator, alleviating the negative impact of information overload on the trainees' learning?

Significance of the Study

This research aligns with the evolving landscape of training and development, offering a unique solution to the challenge of information overload in training programs and fresh perspectives and evidence to support the industry's growth and evolution. The findings of this study hold significant relevance in the fields of training and the graphic recording industry via Kirkpatrick's training effectiveness evaluation. Practically, it might create potential opportunities for graphic recorders, opening up avenues for their expertise to be leveraged in the training and development sector. This transition could also change the underscoring perception that graphic recording was a form of entertainment to an impactful tool for effective training.

While graphic recording has been explored primarily in the context of visual note-taking or Sketchnoting on what benefits they might derive from it, this study zooms in on the role of enhancing training effectiveness, probing a research avenue that has remained relatively unexplored. As the majority of the previous research explored how participants take notes for themselves, this paper offers a distinct perspective, where participants serve as observers alongside their training experiences. Therefore, this study would address the research gaps and contribute to the extant literature.

Delimitations

1. This study conducts an experiment solely in a Taiwanese company in Thailand. The company was chosen for its well-structured approach to selecting training participants and good classroom setting. Consequently, the audience comprises

individuals with similar backgrounds. The researchers targeted managers specifically, anticipating their higher level of responsibility and thus expecting more comprehensive responses in the survey.

2. The research scope is limited to an examination of three primary variables: information overload, training effectiveness, and graphic recording.

3. This study focuses exclusively on the utilization of live graphic recording as a training enhancement tool. It is essential to acknowledge that contemporary training often incorporates supplementary materials such as visual summaries and other aids. However, this research specifically delimits itself to the assessment of live graphic recording which is believed to be useful in training.

Definition of Key Terms

Information Overload

While information overload is a debated concept, there is no universally accepted definition, and the diverse terminologies employed imply varying degrees of this phenomenon. Based on Bawden and Robinson (2018), it has been referred to by many names, such as information overabundance, infobesity, data smog information pollution, fatigue or anxiety, etc.

Gross (1964) was one of the first researchers who introduced the concept of "information overload" on how managers deal with an abundance of information, especially in large organizations, which can lead to inefficiency and reduced decision-making quality. While Gross's work was more concerned with its practical impact on organizational decision-making, Alvin Toffler (1970) examined the broader societal and psychological consequences of information overload from accelerating change and technological advancements which has popularized this term ever since (Moko et al., 2023).

This paper uses Toffler's (1970) description of information overload as the presence of excessive information that can pose challenges for an individual in comprehending an issue, identifying available options, and reaching decisions.

Training Effectiveness

It refers to the intervention achieving its intended goals and objectives. It assesses whether the training has a positive impact on participants and the organization as a whole. The most widely recognized and utilized model was formulated by Donald Kirkpatrick (1959) and was explained into four stages, but it is essential to underscore that this paper primarily focuses on assessing Level 1 (Reaction) and Level 2 (Learning) due to the experimental constraints.

Level 1: Reaction measures the immediate feedback and feelings about the training related to the training materials, trainers, training facilities, and the overall experience; together with, perceptions of how relevant and useful the training content is to their roles and responsibilities. This also includes assessing their involvement, interaction, and enthusiasm during the training sessions.

Level 2: Learning assesses the knowledge and skills acquired by participants as a result of the training. It could be done through quizzes or job-related activities. This stage also involves changes in attitudes, beliefs, and behavior.

Levels 1 and 2 are foundational steps in Kirkpatrick's model, and they provide valuable information about participants' reactions to the training climate and the extent to which they have acquired new knowledge. However, they are just the beginning of the evaluation process, and Level 3 (Behavior) and Level 4 (Results) further assess the real-world application that requires more time to imperially recognize the change.

Graphic Recording

While graphic recording has its roots in visual note-taking, it's crucial to emphasize that. This paper specifically addresses it as an activity undertaken by the graphic recorder, not the trainee. Graphic recording refers to the art of actively listening, synthesizing spoken words, and transforming them into real-time drawings. It entails capturing people's ideas and expressions in the form of words, images, and colors as they are spoken in the present moment (Ink Factory, 2023).

CHAPTER II LITERATURE REVIEW

The purpose of this chapter is to conduct a comprehensive review of prior research related to information overload, training effectiveness, and graphic recording. It commences by clarifying the core concepts of each variable and ventures into an examination of relevant empirical studies. The chapter then discusses the existing literature to establish connections between these variables and concludes by presenting the hypotheses of the current study.

Information Overload

In the digital age, the inundation of information has revolutionized the way individuals interact with data, significantly impacting various dimensions of their lives. Even though Toffler introduced the term 'information overload' (1970), it is unlikely that he could foresee the extensive array of information sources we currently face (Shaw, 2010). Confirmed by a study from Benselin and Ragsdell (2016) has also shown that older people encounter an information load less than the new generation that uses technology. Inevitably, the prevalence of information overload manifests in reduced productivity as individuals grapple with navigating through vast quantities of data (Bettis-Outland, 2012; Blair, 2003; Misra et al., 2020; Mohammed et al., 2021; Roetzel, 2018). Moreover, the stress of staying updated and processing extensive information creates high pressure on both individual and work environments (Borkovich, 2018; Rathore & Farooq, 2020).

Eppler and Mengis (2004) found one of the most cited articles for information overload, identified five widely accepted triggers of this phenomenon. It encompasses information-related factors (quantity, frequency, intensity, and quality), individual factors (receiving, processing, or transmitting information), task-related factors, organizational design (including formal and informal work structures), and the utilization of information technology within a company. The studies referenced, including those by Cheng et al. (2019),

and Moko et al. (2023), focus on the interplay between information and individual processing. A recent study by Arnold et al. (2023) also highlights those intrinsic and extrinsic information characteristics, information needs, the working environment, cognitive abilities, and the information environment significantly influence information overload.

Challenges of Information Overload

Navigating through our studies or training, we often encounter challenges in absorbing new information when instructors overemphasize their content's importance and underestimate their influence, leading to the forgetfulness of memorized material (DiCarlo, 2009). Cordiner (2021) identified a key issue, "One of the biggest problems we need to address is not what should be added to our courses, but rather what needs to be removed." Many trainers may not realize the threshold of 'too much' for learners, often driven by a positive intention to share all their knowledge. However, effective training requires more than good intentions; it necessitates have consistent managerial commitment to conveyed principles to prevent learners from getting lost amid competing pressures, information, and perspectives (McCall, 2020). Highlighting this concern, a recent study by Bafaneli and Setibi (2015) reinforces the idea that excessive training within a single session can lead to information overload and employee fatigue. To streamline the learning process, designed processes reduce the cognitive load, sparing students from constant decision-making about essential information (Ahern & De Kirby, 2011).

Initially regarded as a concern primarily impacting scholars and academia, it was later recognized as a challenge affecting broader society, influencing business and domestic life (Bawden & Robinson, 2020). Throughout half a century, many researchers have proven how information overload causes poor decision-making processes as the multitude of choices available, results in decision fatigue (Bettis-Outland, 2012; Cheng et al., 2019; Zer et al.,

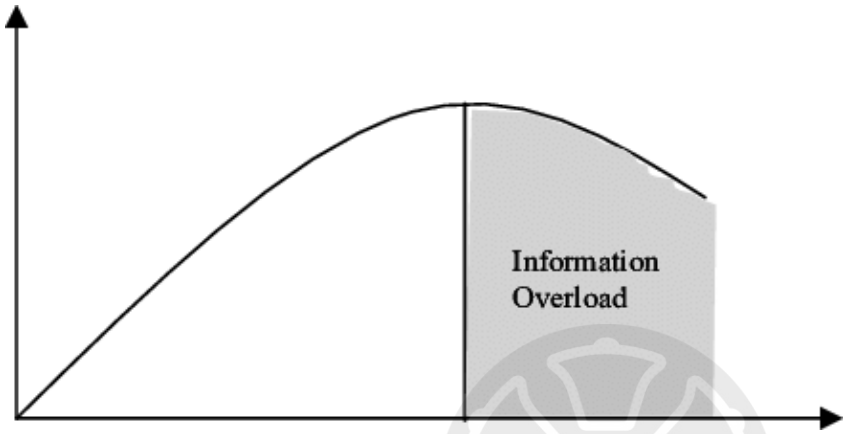
2023). Toffler (1970) stated that "When the individual is plunged into a fast and irregularly changing situation or a novelty-loaded context ... his predictive accuracy plummets. He can no longer make the reasonably correct assessments on which rational behavior is dependent" (pp. 350-351). A compelling study conducted by Cheng et al. (2019) shows that electric vehicle companies aim to showcase the quality and functionality of their products. Yet, when consumers, whether well-versed or with limited knowledge about the product. Encountering a vast array of information, they tend to face confusion or boredom (van Braak et al., 2023). The excessive volume of information surpasses their capacity for processing, resulting in a feeling of information overload and delaying or harming the final purchasing decision-making. Supported by Cameron (2019), companies often frequently create incremental products to gain an edge over rivals, but fail to promote by providing detailed specifications or features, inadvertently leading to a state of mental disarray, making it challenging to process, organize, and make sense of the information. This confusion impedes effective decision-making and the extraction of valuable insights, as individuals struggle to filter through the massive data pool to identify the most pertinent and credible information.

Additionally, recent research by Zer et al. (2023) also validated investors inundated with excessive information face higher information and estimation risks. This overload impacts their investment forecasts, as crucial data remains unanalyzed due to limited attention. According to Arnold et al. (2023) and Cameron (2019), ambiguity arises from conflicting sources, contradictory data, or the absence of context, making it difficult to distinguish truth from misinformation or relevant from irrelevant information. As a result, individuals may find themselves uncertain about which data to trust or use, hindering their ability to make informed decisions or draw meaningful conclusions. These findings can ultimately demonstrate that success doesn't always hinge on having more information – As Herbert A. Simon (1971), the Nobel Prize awardee for decision-making theory, succinctly

captures this idea: "A wealth of information creates a poverty of attention". Figure 2.1 presents a diagram found by Schroder et al. (1967), which shows how information load has an inverted U-curve relationship with decision-making (Eppler & Mengis, 2004).

Figure 2.1

Information Load and Decision-making



Note. Adapted from "The concept of information overload: A review of literature from organization science, accounting, marketing, MIS, and related disciplines" by Eppler, M. J., & Mengis, J., 2004, *The Information Society, 20*(5), 326. Copyright 2004 by Taylor & Francis.

Cognitive Load Theory (CLT)

To theocratically explained how human brain work, Cognitive Load Theory, pioneered by John Sweller (1988), is usually cited to further explain the phenomenon of information load as it explores the boundaries and capabilities of human cognitive resources (Arnold et al., 2023; Belabbes et al., 2022; Eppler & Mengis, 2004; Moko et al., 2023; Roetzel, 2018; Yu et al., 2023). The theory posits that our working memory, which plays a vital role in processing information, is limited in its capacity. When this working memory is overwhelmed, it impairs an individual's capacity to efficiently process, learn, and retain

information. Moreover, information overload can lead to what CLT describes as extraneous cognitive load, caused by the instructional material used. This occurs when cognitive resources are unnecessarily consumed by managing irrelevant or excessive information, leaving fewer resources available for understanding and learning new concepts (Chandler & Sweller, 1991). To reduce extraneous load is to encourage the germane load imposed when learners generate learning schemas that can be supported by learning design (De Jong, 2009; Skulmowski & Xu, 2021; Sweller et al., 1998).

The fundamental idea behind CLT is that learning is more effective when the intrinsic cognitive load is balanced with the available capacity of the working memory (Sweller, 1988). Information overload disrupts this balance, increasing the extraneous cognitive load and reducing the cognitive capacity available for meaningful processing and learning. Therefore, to overcome the challenges, it's essential to manage the quantity and complexity of information presented (De Jong, 2009; van Merrienboer et al., 2003). This could involve breaking down information into smaller, more digestible chunks (Gerjets & Scheiter, 2003; Ismael, 2020; Woolsey, 2017), and utilizing effective instructional design strategies (Skulmowski & Xu, 2021) in a way that minimizes cognitive strain (Mayer, 2002).

Forgetting Curve Theory

"Since memory capacity is limited, even 'good' processes may overload working memory" (De Jong, 2009, p.110). While attempting to address information overload by aiming to capture individuals' attention or comprehension, another challenge associated with information retention emerges. Explained by using the Forgetting Curve Theory from Ebbinghaus in 1885, it illustrates how information is rapidly forgotten over time if not reinforced. As individuals are exposed to an excessive amount of information, they face a dual challenge. First, the capacity to retain new information is hindered as the brain struggles

to process and store too much data. Second, the ability to revisit and reinforce is compromised due to the continual arrival of new information, meaning the attention and time available diminishes. Consequently, the curve steepens, leading to faster decay and forgetting of information, as there is limited opportunity for consolidation and repetition (Bliss, 2023). Prioritizing essential and relevant information, establishing structured revision schedules, and implementing engaging tools or systems for organizing and storing information are pivotal to counteracting the rapid forgetting induced by information overload (Denny, 2021; McGarry, 2022).

Consequently, Information overload not only alters decision-making but also influences learning capability. With the constant barrage of data, our brain contributes to increased anxiety and information fatigue syndrome, characterized by stress, mental exhaustion, and disinterest in engaging with new information. This multifaceted impact necessitates a comprehensive approach to managing information overload, requiring techniques to mitigate these challenges effectively. Bawden and Robinson (2018) suggest that "The best ways of avoiding overload, individually and socially, appear to lie in a variety of coping strategies, such as filtering, withdrawing, queuing, and 'satisficing'. Better design of information systems, effective personal information management, and the promotion of digital and media literacies, also have a part to play" (p. 2).

Training Effectiveness

'Training' and 'Learning' are interconnected yet represent distinct elements within the educational process, objective, and focus (Ismael, 2020). While companies continue to put more resources into development programs, they expect that the individual could perform and deliver positive outcomes to the organization (Salas & Cannon-Bowers, 2001; Training Magazine, 2022). To put it simply, "Training is about the organization. Learning and

development are about the individual." wrote Parker HR (2022). As some organizations are still concerned about the contribution of training; hence, it's crucial for the company to ascertain the training effectiveness using a systematic process to determine its value or meaning (Farjad, 2012; Nickols, 2005). Numerous academics employed Bloom's Taxonomy in 2001 to evaluate learning outcomes to understand the hierarchical process of how individuals learn in training, this research paper prioritizes the training process itself, emphasizing its effectiveness on the trainee and graphic recording enhancement by using the Kirkpatrick Training Evaluations model in 1959.

Kirkpatrick Training Evaluations Model

To begin with, Donald Kirkpatrick did not originate the model himself; rather, he adapted it from his university professor, Raymond Katzell. However, Kirkpatrick's practical terminology in 1954 significantly contributed to the model's widespread acceptance (Thalheimer, 2018). Illustrated in Figure 2.2, the Kirkpatrick model employs four levels of evaluation from his first creation in the 1950s (Kirkpatrick Partners, 2022) which comprises:

Level 1 - Reaction: Measure participants' immediate response and feedback

Level 2 - Learning: Evaluate the knowledge and skills acquired during the training

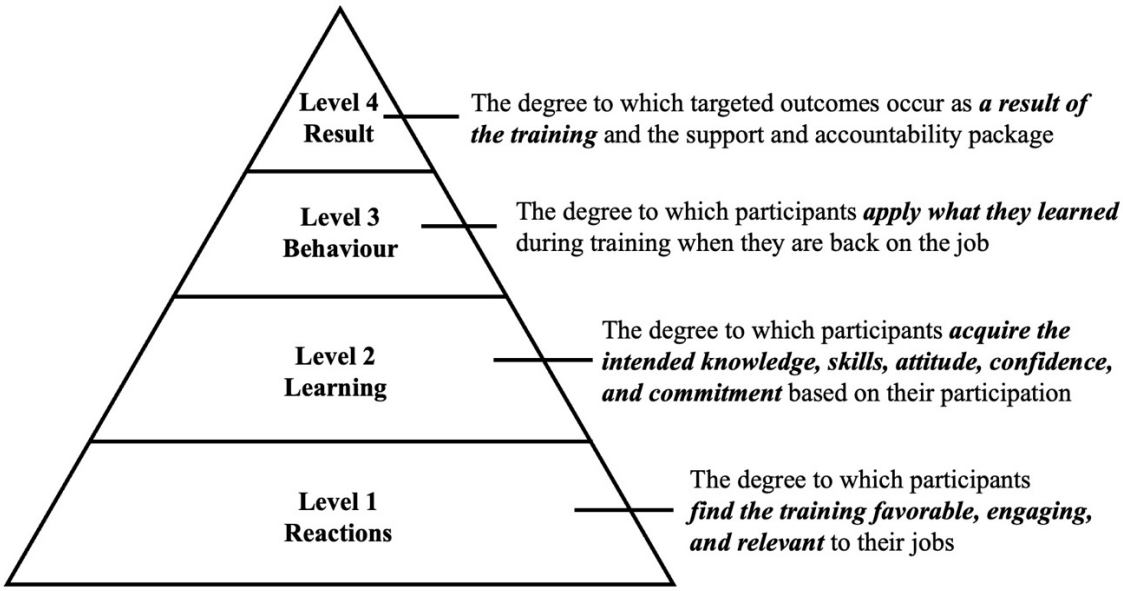
Level 3 - Behavior: Assess the application of acquired knowledge in the workplace

Level 4 - Results: Examine the broader impact on organizational performance

The pyramid shape suggests a structured and sequential approach to evaluating training effectiveness, with the foundational levels providing a basis for the higher-level outcomes.

Figure 2.2

4 Levels of Original Kirkpatrick's Model



Note. Adapted from *The Kirkpatrick model* by Kirkpatrick Partners, 2022. (https://www.kirkpatrickpartners.com/the-kirkpatrick-model/)

The Kirkpatrick model stands out as the most extensively employed training evaluation framework in both private and governmental sectors worldwide (Cheung et al., 2023; Farjad, 2012; Moldovan, 2016; Nickols, 2005; Salas & Cannon-Bowers, 2001). The extensive use of the Kirkpatrick model across diverse industries and training programs validates its broad utility. For instance, self-development training (Sahni, 2020), higher education (Achuthan et al., 2023; Alsalamah & Callinan, 2021; Farjad, 2012; Goh et al., 2017; Zhao et al., 2023), healthcare (Jones et al., 2018), and with the advent of technology, an increase in online training assessments has been observed (Achuthan et al., 2023; Goh et al., 2017; Hamtini, 2008; Suraj & N, 2023). Some studies have also employed this criterion to demonstrate the return on investment of their training (Jonny, 2016). Moldovan (2016) found that the use of this model assisted in directing purposeful inquiries and determining subsequent actions: “Not only help the training professional plan the intervention but help the

trainees or employers understand the factors that facilitate training transfer and produce business results" (p.1190).

Bates (2004) highlighted the reasons behind its popularity, as it simplifies the complex process by serving as a direct guide for asking appropriate questions and establishing suitable criteria. Additionally, it reduces the necessity for extensive measurements by focusing the evaluation process after the training. By centering solely on outcome measures, the model significantly diminishes the number of variables considered, removing the need to account for the intricate network of factors typically involved in training assessments. Jones et al.'s literature (2018) also shows that this model can adopt diverse approaches to evaluating each level. They implemented four distinct methodologies for assessing a home-based pediatric nursing service, the same as Zhao et al. (2023) that evaluated the EMI training for teachers, highlighting the need for a reliable matrix in the evaluation process.

Nevertheless, the model is not immune to criticisms and challenges. Recent work has either expanded it or pointed out weaknesses, such as the need to develop more diagnostic measures. The four-level model offers a simplified perspective on training effectiveness, disregarding individual or contextual influences in the assessment of training. Some assert that it may oversimplify the complexities of training evaluation, particularly in quantifying higher-level outcomes like organizational impact (Bates 2004; Cheung et al., 2023; Salas & Cannon-Bowers, 2001). One of the most notable is the reliance on the 'Smiling test' at Level 1, which primarily focuses on the immediate reaction of participants without delving into subsequent outcomes. This criticism emphasizes that the initial reaction may not fully capture the training's effectiveness (Filipovic, 2021; Nickols, 2005; Thalheimer & Vector Solutions, 2018). However, some argue that assessing the initial reaction is beneficial in determining if the trainer creates a positive atmosphere (Hamtini, 2008; Jones et al. 2018; Jonny, 2016;

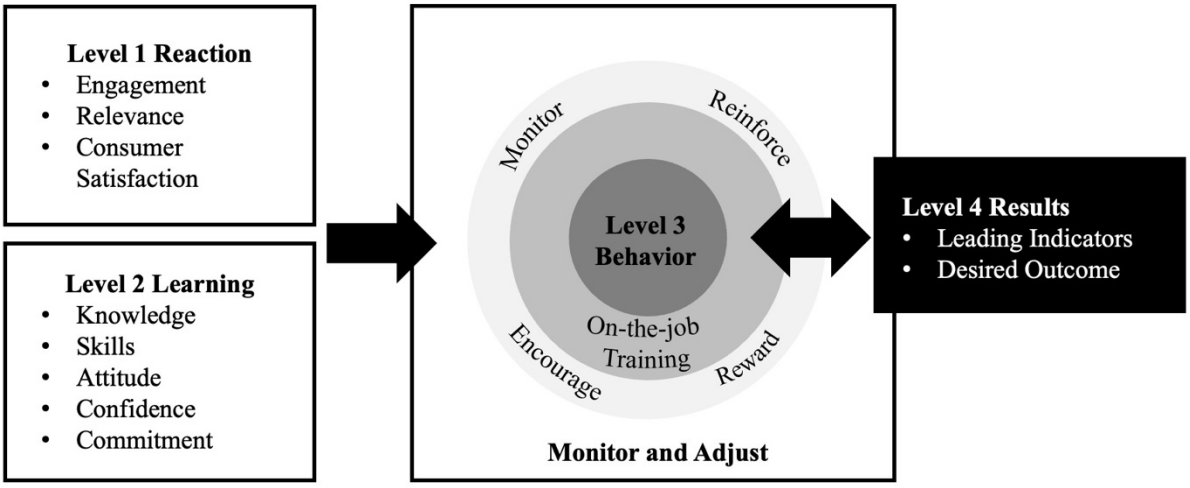
Smidt et al., 2009). Research by Sahni (2020) and Salas and Cannon-Bowers (2001) revealed that the training environment significantly influences trainees, enhancing engagement, attention, and retention. Other challenges also include the subjectivity of reaction-level assessments and the difficulty in measuring intangible outcomes. Implementing the model practically and reliably assessing certain intangible results can also pose challenges (Bates 2004; Cheung et al., 2023; Kirkpatrick & Kirkpatrick, 2005; Nickols, 2005; Salas & Cannon-Bowers, 2001).

The New World Kirkpatrick Model

In response to a constantly evolving training landscape and world trend, the New World Kirkpatrick model (See Figure 2.3) was adapted, written by his son, Jim Kirkpatrick (2021). Contemporary adaptations have seen the integration of technology in the evaluation process and refinements in aligning training objectives with organizational strategies. The model has evolved to underscore the strategic role of training in accomplishing organizational goals, emphasizing its significance in the broader context of organizational success. The significant changes in the have Level 3. They encompass key drivers such as reinforcement, monitoring, encouragement, and rewards to motivate learners to apply their training outside the formal program. Additionally, the learners' motivation in Level 1 and commitment in Level 2 to enhancing their job performance are intervening factors that can significantly impact the outcomes at Level 3 (Gandomkar, 2018; Kirkpatrick & Kirkpatrick, 2022).

Figure 2.3

The New World Kirkpatrick Model



Note. Adapted from "An introduction to The New World Kirkpatrick" by Kirkpatrick J., & Kirkpatrick W. K., 2022, p. 5. Copyright 2010-2022, Kirkpatrick Partners, LLC

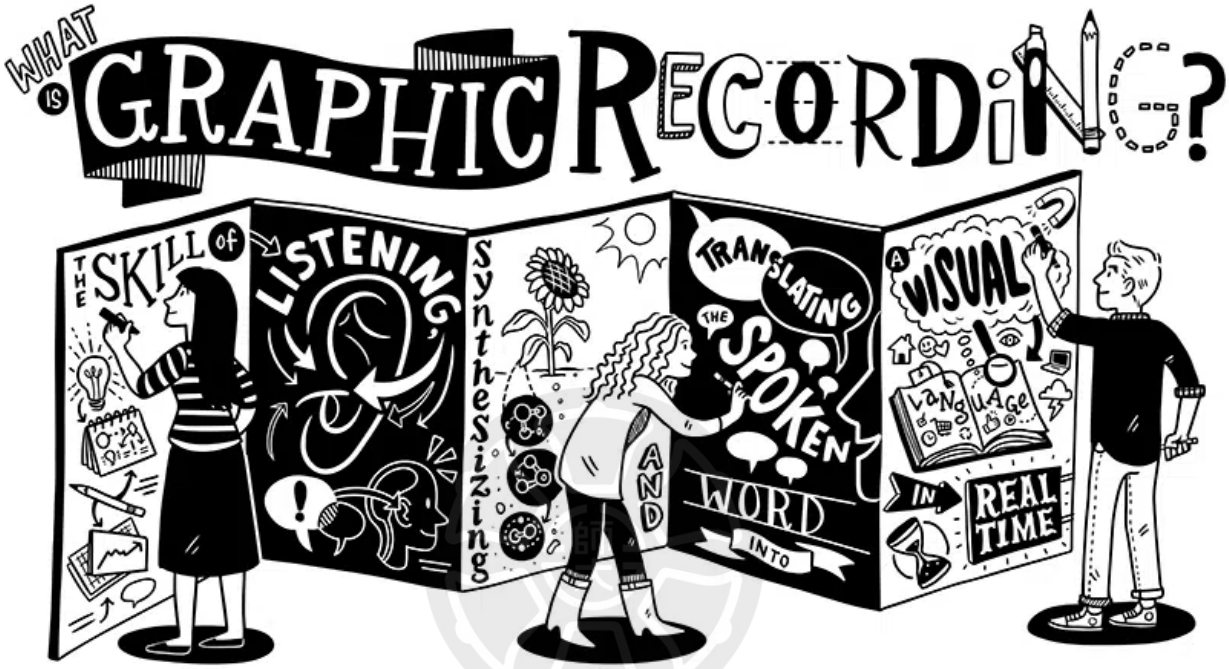
Graphic Recording

Studies indicate that visual aids create compelling and memorable content that resonates with audiences (Dean-Coffey, 2013; Udomon et al., 2013; Zeyab et al. 2020). Graphic recording, also known as graphic facilitation or visual note-taking, is a method involving the capture of ideas, discussions, and presentations in real-time using a blend of images, text, and diagrams (Agerbeck, 2012; Larkin, 2023; Neil, 2022; Rohde, 2012). This technique serves as a form of visual storytelling, facilitating efficient communication of intricate concepts, often employed in workshops, meetings, conferences, and educational settings (Figure 2.4). The trend of using a 1-page visual summary is increasing (Yamamoto et al., 2021); together with, handcrafted visuals created by human skills are increasingly gaining popularity due to the perceived lack of authenticity from AI-generated content (Dimeo, 2017, Tran 2021). Due to technological advancements, digital tools, and applications have made the creation and sharing of visual records more accessible, broadening its reach beyond physical

spaces to virtual platforms (Ink Factory, 2021; Kingman Ink, 2023; Neil, 2022; Rohde, 2012; Zheng et al., 2021).

Figure 2.4

What is Graphic Recording?



Note. Adapted from *What is graphic ecording? Visual Note-Taking and More* by Ink Factory. 2023. (https://inkfactorystudio.com/blog/what-is-graphic-recording/)

Graphic Recording vs Visual Note

Researchers often delve into visual note-taking or sketchnoting techniques (Araújo et al., 2022; Courneya and Cox 2020; Gonzalez, 2018; Lopatovska et al., 2016; Neil, 2022; Paepcke-Hjeltness et al., 2017; Perry et al., 2017; Pillars, 2016; Rohde, 2012; Zeyab et al., 2020). The key distinction lies in their application and audience. Graphic recording primarily caters to a wider audience, striving to capture and convey collective ideas. Conversely, visual note-taking is highly personalized, and tailored to individual understanding and memory

retention. Educators advocate for visual note-taking as a tool to aid individuals in effectively summarizing and retaining key content. However, “Sketchnoting is not an ‘end all’ to information synthesis, and not everybody adapts and implements it as quickly as others” (Paepcke-Hjeltness & Lu, 2020, p.63). Some have expressed that it might not be as helpful as expected as it appears to be more time-consuming compared to traditional note-taking methods. (Bratash et al., 2020). Nonetheless, feedback from Lopatovska et al.'s (2016) experiment suggested that visual graphics might inadvertently isolate individuals who do not resonate with this method, as generally, people thought that it is an effective learning approach. Some situations might lead to a lack of confidence, especially if the teacher repeatedly emphasizes that 'everyone can draw,' yet fails to help students develop this skill (Courneya & Cox, 2020; Neil, 2022).

Myth and Evidence: Advantages of Graphic Recording

Due to limitations in artistic skills and the potential time required to train individuals, the concept of graphic recording was introduced with the intention of providing similar benefits to those of visual note-taking. An inevitably pivotal reason for the wide acceptance of graphic recording is its offer to aid memory. As 3M Corporation internal research shows, the brain processes visual information notably 60,000 times faster than text, and 90 percent of the information transmitted to the brain is in a visual format (Trafton, 2014), making the use of images particularly effective for memory retention. “Not only capture attention but also serve as "bookmarks" in the brain” (Ink Factory, 2021) In educational contexts, integrating graphic recording during lectures or discussions plays a pivotal role in enhancing understanding and knowledge retention (Dadzie et al., 2020; Dalali & Mwila, 2022; Dean-Coffey, 2013; Dimeo 2016; Lewis & Sturdee, 2023; Lopatovska et al., 2016; Perry et al., 2017; Wammes et al., 2016). As shown in Gharravi’s (2018) research findings there was a

statistically significant increase in the final exam performance of medical students who utilized the visual note approach compared to those who did not. However, concern has arisen regarding the efficacy of learning through viewing a graphic recorder's work (created by a third party) in comparison to actively taking visual notes oneself. An experiment conducted by Stull and Mayer (2007) addressed this issue, revealing no significant difference between the two approaches which goes against the learning-by-doing theory. Both participants demonstrated similar levels of retention, aligning with the cognitive load theory.

Another primary advantage of employing graphic recording is evident in the high engagement rates resulting from the compelling skills of the graphic facilitator (Haugh & Macfarlan, 2020; Larkin, 2023; Sandholdt et al., 2022). As confirmed by a recent study conducted by Sandholdt et al. (2022), graphic recording was utilized as a facilitation tool in a COVID-19 health promotion intervention designed for middle-aged and senior citizens in Denmark. Through the collaborative generation of visual records, participants developed a greater sense of ownership and were encouraged to reflect upon their engagement with the researchers. This innovative approach can hold promise for engaging socio-economically vulnerable populations. On the other hand, in a practical interview with a graphic recording client, Channing Miller, “It sometimes competes visually with the speaker” (Thomas-Larmer, 2022). This creates confusion for the audience, as they struggle to decide where to direct their focus - on the speaker or the graphic recorder, on the content or the impressive artistic display.

A common practice today after finishing the conference, workshop, or panel discussion, is to distribute a completed summary graphic recording to the audience or share it on social media as an event summary, hoping to promote event content to a wider target. However, a pertinent question arises: How many individuals will actually pay attention to it? Irber (2021), a graphic recorder reflecting on the value of their work, “Unfortunately – like a

holiday picture". Just as one who participated in a holiday remembers the feeling in a photo, only a few people can recall what happened while the ones who did not attend tend to be drawn to its visual appeal, briefly engaging with it before moving on. Not to mention that graphic recording is a real-time summarization, it carries risks that the message might be conveyed differently, essential keywords might not be emphasized accurately, or there might be limitations with space and even running out of space to write. Given the expensive fees associated with hiring graphic recorders, a pertinent question emerges: Is graphic recording truly worth the investment? (Thomas-Larmer, 2022). These are some things that future Human Resources or educational instructors might take into consideration.

Information Overload and Training Effectiveness

With technological advancements and evolving trends, there is a growing emphasis on assigning additional training to keep up with new skills (Blume et al., 2009; Dermol & Cater, 2013; Kaban & Amanda, 2022). However, the abundant of information and the frequency of training can cause the trainee to face information overload (Alken et al., 2018; Bafaneli & Setibi, 2015; Cawley, 2020; Gibbons, 1991; Kidd, 2021; Obmiński, 2016). While recognizing the importance of continuous learning (Barrett & O'Connell, 2001; Donnell, 2018; Woolsey, 2017) as the best way to overcome this phenomenon is to divide it into smaller parts (Ismael, 2020; Gerjets & Scheiter, 2003; Kidd, 2021; Woolsey, 2017) and frequently revisit it (Bliss, 2023). The question arises regarding the extent to which we can rely on the natural forgetfulness of individuals (Grannis, 2020) and how efficiently the settings arranged by the trainer and the time and travel costs incurred by the trainees be fulfilled (Ismael, 2020). Therefore, it is suggested by Camargo (2008) that alternative creative solutions, such as instructional videos or presentations, were identified as potential contributors to enhancing employee training in the context of managing information overload.

To effectively measure the impact of training on the trainee's, training evaluation is needed (Farjad, 2012; Gandomkar, 2018; Jones et al., 2018; Jonny, 2016; Hamtini, 2008; Sahni 2020). Although Kirkpatrick's model, originating in the 1950s, is perceived as outdated and lacking in comprehensive measurement (Bates 2004; Cheung et al., 2023; Salas & Cannon-Bowers, 2001), it remains widely used in the training field. Despite Kirkpatrick's initial suggestion to assess training on all four levels to gain a complete understanding, it is acceptable to selectively choose assessment levels based on training design, as supported by studies (Hamtini, 2008; Sahni 2020).

This experimental study concentrates on the initial two levels of training effectiveness, namely reaction and learning, to assess the immediate impact of graphic recording in reducing information overload. The focus is on evaluating whether participants remember information better and are more engaged in learning. It is important to note that the effectiveness of the content itself, whether useful or not, is still contingent on the quality of the trainer's instruction; graphic recording serves as a presentation tool; therefore, assessing whether this leads to actual behavioral change (Level 3) that contributes to organizational performance (Level 4) is beyond the scope of this study.

Kirkpatrick's Training Effectiveness Level 1: Reaction

As its assessment delves into the user experience, satisfaction, and engagement of participants during the training session, the reaction is essential as it provides valuable insights into participants' immediate responses and perceptions of the training experience (Kirkpatrick, 1959). Information Overload directly influences the participant experience, as it pertains to the manageability and relevance of the presented content (Camargo, 2008). By measuring reactions, trainers can gain insights into whether participants found the volume of information to be appropriate, engaging, and pertinent to their roles. Understanding

participant reactions is crucial for refining training content and methods in the future, ensuring that it aligns with participants' expectations and promotes a positive learning environment. Assessing Information Overload at Level 1 not only aids in adjustments to improve the training experience but also lays the foundation for subsequent levels of Kirkpatrick's model, contributing to the overall effectiveness and success of the training program (Sahni, 2020; Salas & Cannon-Bowers, 2001; van Braak et al., 2023). Even when reactions are effectively measured, it doesn't guarantee that significant learning has occurred (Jonny, 2016).

Kirkpatrick's Training Effectiveness Level 2: Learning

While Level 1 focuses on immediate reactions, Level 2 assesses the actual learning outcomes resulting from the training which is meant to be the heart of training (Jonny, 2016). Referring to the mentioned theory of cognitive overload, as humans have a limited capacity for storing and processing information in real-time, this negatively influences trainees' ability to sustain attention and focus, hindering their capacity to concentrate on essential aspects of the training (Arnold et al., 2023; Belabbes et al., 2022; Eppler and Mengis, 2004; Moko et al., 2023; Roetzel, 2018; Yu et al., 2023). This overload can also lead to reduced retention of crucial learning points, making it challenging for learners to recall and apply the acquired knowledge effectively. Further exacerbating the situation, trainees may get confused and not understand concepts, impacting learning outcomes which will affect learners' motivation, causing boredom afterward (Alken et al., 2018; Bafaneli & Setibi, 2015; Cawley, 2020; Kidd, 2021; Gibbons, 1991; Obmiński, 2016; Rio, 2019; Yurynets & Khavura, 2021; Yu et al., 2023). Moreover, information overload can have negative effects on cognitive processing and decision-making. When individuals are exposed to excessive information, it can lead to difficulties in prioritizing, processing, and assimilating information effectively (Bettis-

Outland, 2012; Cheng et al., 2019; Zer et al., 2023). Building upon past research, the following hypotheses are proposed:

H1: Information overload has a negative impact on the trainees' reactions, and reduces Kirkpatrick's training effectiveness Level 1

H2: Information overload has a negative impact on the trainees' learning, and reduces Kirkpatrick's training effectiveness Level 2

Graphic Recording as a Moderator

Graphic recording serves as a tool that extends cognitive capacities beyond limitations. By creating an external representation of ideas, individuals can overcome the constraints of their working memory which is responsible for temporarily holding and manipulating information (Sweller, 1988). To excel in the ability of working memory, the commonly used example is noting down ideas on sticky notes, or index cards, or capturing them on a single page, which enables individuals to manipulate and comprehend the connections between ideas without relying solely on memory. This method provides a reference point, facilitating the processing of complex ideas without losing sight of the bigger picture (Neil, 2022). Paepcke-Hjeltness et al. (2017) also found how visual aids facilitate the connection between concepts, enabling engineering students to identify patterns. While Khairat et al. (2018) emphasizes the direct benefits of visuals in alleviating information overload in the healthcare industry. They discuss the use of visualized patient data dashboards, which not only reduce data collection time and associated challenges but also contribute to enhancing situational awareness, safety compliance, usability, and navigation.

Visualization Theory and Dual Coding Theory

In the context of visualization theory, externalizing the mental visualization process into tangible and shareable visual representations can facilitate mental imagery which assists the audience or participants in forming vivid mental images. This will enhance understanding of the processing and organization of complex data (Johnson, 2004). In the meantime, dual coding theory involves the combination of words and visuals to enhance cognitive processing and support information retention (Paivio & Csapo, 1973). The example explanation by Neil (2022), when presented with an image of an apple and the word "nutrition", distinct sets of neurons in the brain are activated, triggering memories and associations related to both visuals and words. These neural networks often overlap, utilizing the brain's visual processing to support information retention by creating new connections between visual and verbal elements. Paivio and Csapo (1973) also discovered the picture superiority effect, the phenomenon in which pictures and images are more likely to be remembered than words which is related to the fact that humans are visual learners (Felder & Soloman, 1993). These theories highlight the benefits of graphic recording, as it not only enhances immediate processing power but also aids in the retention of new ideas by linking visual and verbal information.

"Less is more" – if the material doesn't help make the topic clearer or memorable, it's better to eliminate it (Kidd, 2021). In the context of compelling and concise graphic recording that condenses information into one page, is a great supporting tool for training. As mentioned in the discussion sector by Bawden and Robinson (2018), it suggests that to manage information overload, they should use filtering, withdrawing, and queuing tools to assist cognitive processing. More importantly, individuals and communities should employ coping strategies to balance their interaction with information. One such strategy is "satisficing" by choosing adequate solutions or information that meet their needs without

overwhelming them. This balance involves being conscious and deliberate about the information one consumes, ensuring that the intake is purposeful and meaningful. It emphasizes the significance of understanding rather than simply accumulating information. This aligns with Ann Blair's (2003) perspective on the act of taking notes on understanding and synthesizing information, not just recording it verbatim. This mindful approach to information handling can assist individuals in avoiding overload by prioritizing comprehension and meaningful engagement with the information they encounter. Even if the participants in this research are not actively taking notes themselves, observing the graphic recording during the training could still decrease the level of extraneous cognitive processing and allow generative processing. (Stull & Mayer, 2007).

By taking into account the statement, "Without any action on the side of the learner, there cannot be cognitive load. This means that cognitive load only starts to exist when the learner relates elements, makes abstractions, creates shortcuts, etc." (De Jong, 2009). It can be observed that graphic recording, by simplifying complex content and condensing key concepts through visualization, has the potential to enhance learning effectiveness by stimulating active cognitive engagement. Consequently, this can be predicted that graphic recordings might be able to buffer the negative relationship between information overload and training effectiveness among the trainees. Based on the visualization theory, dual coding theory, and previous empirical studies, the following hypothesis is proposed:

H3: Graphic recordings weaken the negative relationship information overload on the trainees' reactions

H4: Graphic recordings weaken the negative relationship information overload on the trainees' learning

CHAPTER III METHODOLOGY

In this chapter, the methodology employed in the study is presented to assess hypotheses and attain research objectives. The chapter delineates key methodological considerations, encompassing the research framework, research procedures, research sample, data collection, measurement instrument, pilot test, main study test, and data analysis.

Research Framework

The research framework has evolved from thorough literature reviews and draws upon various theories to effectively address the research objectives. Specifically, the study demonstrates the capacity of graphic recording to mitigate the adverse impact of information overload on training effectiveness. Figure 3.1 illustrates the specific relationship explored in this research, with information overload serving as the independent variable, training effectiveness levels 1 and 2 (reaction and learning) as the dependent variables, and graphic recording as the moderator.

The hypotheses proposed in this study are presented as follows:

Hypothesis 1 Information overload has a negative impact on the trainees' reactions and reduces Kirkpatrick's training effectiveness Level 1

Hypothesis 2 Information overload has a negative impact on the trainees' learning and reduces Kirkpatrick's training effectiveness Level 2

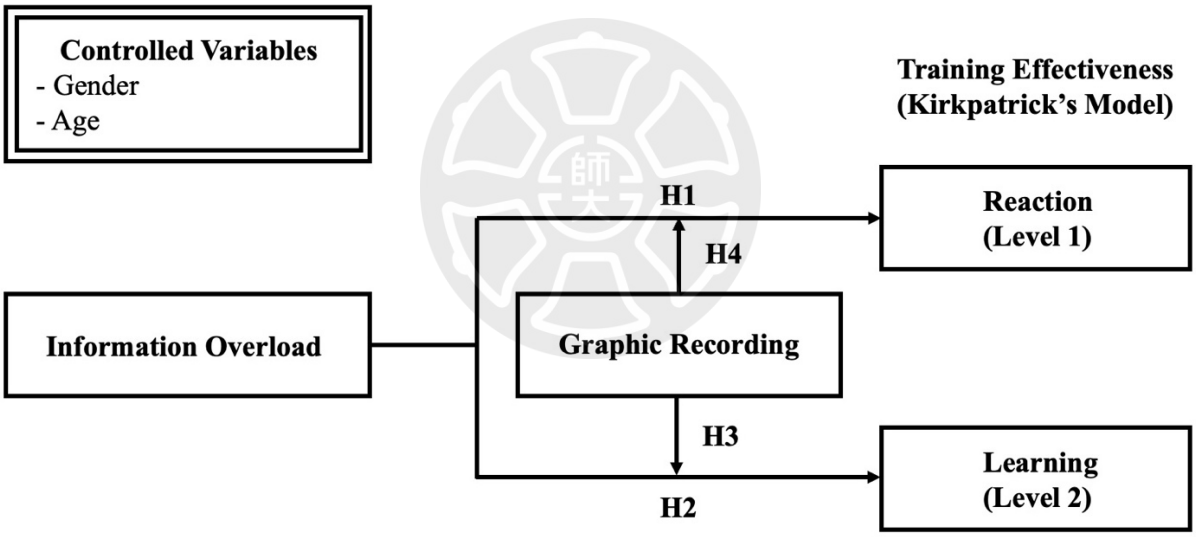
Hypothesis 3 Graphic recordings weaken the negative relationship information overload on the trainees' reactions

Hypothesis 4 Graphic recordings weaken the negative relationship information overload on the trainees' learning

Hypotheses 1 and 2 are substantiated through the amalgamation of the conservation of cognitive theory (Sweller, 1988) and the forgetting curve theory (Ebbinghaus, 1885), coupled with the well-established Kirkpatrick model for evaluating training effectiveness. On the other hand, hypotheses 3 and 4 are formulated based on principles from the visualization theory (Johnson, 2004) and dual coding theory (Paivio & Csapo, 1973). The experimental design is also influenced by a study conducted by Gharravi in 2018 on how instructor-provided notes will impact students' examinations.

Figure 3.1

Research Framework



Research Procedure

This section offers an overview of the anticipated course of action for this study. The research procedure is delineated into multiple steps, illustrated in Figure 3.3, which is presented towards the conclusion of this section.

Statement of Research Problem

The genesis of the current research problem stems from the author's firsthand experiences in previous fieldwork scenarios, particularly as a graphic recorder within the conference and training industry. Occupying this role, with its inherent challenges and engaging audience dynamics, sparks an interest in assessing its actual effectiveness. Despite its widespread popularity, the concrete outcomes of this approach remained uncertain. Driven by a curiosity about the impact of the work contributed, the author sought to gauge the tangible results for clients beyond financial remuneration. A comprehensive review of related research studies revealed a predominant focus on promoting visual note-taking, with limited emphasis on the efficacy of graphic recording itself. Subsequently, the research concept underwent multiple discussions with the thesis advisor, leading to the formulation of the present topic, exploring the influence of graphic recording on information overload and training effectiveness.

Literature Reviews

Extensive scrutiny of existing research, encompassing both direct and tangential studies in relevant domains, is undertaken to ascertain the uniqueness of the present research topic. This comprehensive review serves a dual purpose: first, to confirm that no prior investigations have delved into the specific focus of the current study, and second, to foster a deeper understanding of the intricacies surrounding the research issue. The examination of related literature facilitates the development of a conceptual framework, wherein existing theories are employed to analyze the research problem systematically, providing logical insights and supportive rationale.

Development of the Questionnaires

This study adopted a quantitative approach, employing an experiment methodology with an examination and questionnaire as the primary data collection instrument. The examination was meticulously crafted by using Kirkpatrick's question guideline while other validated questionnaire was chosen to measure other aspects, drawing upon the reliability of previous studies. The instrument encompasses measures for two distinct variables: information overload and training effectiveness (See Appendix A).

A translation process ensued since all questionnaire items were originally formulated in English. The author undertakes the initial translation of the items into Thai, followed by a thorough review by two experts who are bilingual to ensure the precision and accuracy of the translation. This meticulous translation process aims to maintain the integrity of the survey instrument and facilitate its applicability in the Thai context.

Experimental Design

The process involves the systematic division of participants into two distinct groups. The following steps outline the procedure (Figure 3.2):

1. *Group Assignment:*

   Participants are confined to managerial positions within a company who have not previously undergone similar training content, designated either for training that incorporates graphic recording (experimental group) or training without the graphic recording component (control group). Participants are randomly assigned to experimental and control groups, allowing any identified variations in learning outcomes to be attributed specifically to the introduction of graphic recording rather than pre-existing participant characteristics.

2. *Training Implementation:*

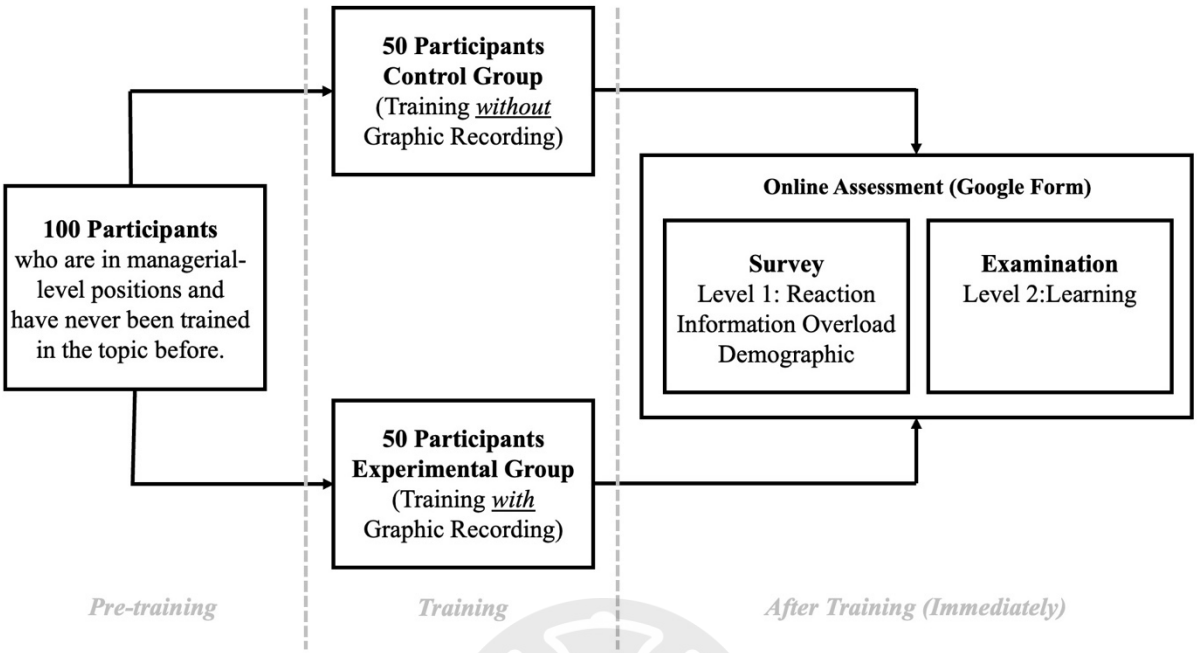
The training sessions are conducted in real in-house settings to demonstrate the genuine ability of graphic recording in practical situations, using a topic that is not specific to any one department, such as “Systematic Thinking.” The experimental group participates in training sessions that incorporate graphic recording, while the control group undergoes the same training without this visual aid. The trainer, content, and duration of the training sessions are kept consistent between the two groups to isolate the impact of graphic recording.

3. *Data Collection Instruments (Google Form):*

- Exam (Kirkpatrick's Level 2 - Learning): Both groups are subjected to a post-training examination to assess the knowledge acquisition of participants. The exam is designed to evaluate the depth of understanding and retention of the training content.
- Survey (Kirkpatrick's Level 1 - Reaction): Participants in both groups are administered a survey to observe their reactions and subjective responses to the training experience. This survey captures perceptions, attitudes, and satisfaction levels related to the training, providing insights into participants' immediate reactions.

Figure 3.2

Experimental Design



Data Analysis

Collected data from the exam and survey responses is subjected to statistical analysis. Comparative analyses between the experimental and control groups are performed to identify any significant differences in learning outcomes and reactions to the training. Statistical tests such as descriptive statistics analysis, Pearson correlation analysis, and hierarchical regression analysis are applied using SPSS software version 29.

Result Interpretation

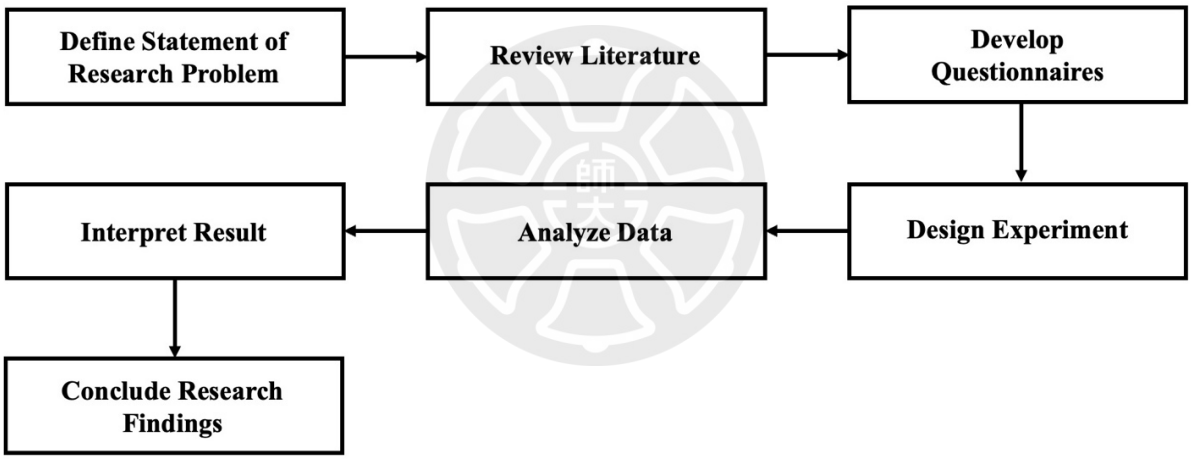
The findings obtained through data analysis are employed to scrutinize and interpret the study's implications. Concurrently, the literature review serves as foundational support for the comprehensive discussion of the overall findings.

Conclusion and Suggestion

By systematically implementing these steps, the experiment-based research design enables a rigorous examination of whether the inclusion of graphic recording positively influences the learning outcomes and reactions of managerial-level individuals in training, as assessed through both Kirkpatrick's Level 1 and Level 2 evaluations (Gharravi, 2018). The primary objectives and findings of the study are summarized. Subsequently, suggestions and recommendations for future research endeavors are offered.

Figure 3.3

Research Procedure



Research Sample and Experimental Procedure

Effective information communication requires an active examination of the content by the recipients (Thorell et al., 2008). In this research, the sampling and data collection process is methodically designed to investigate the impact of graphic recording on the learning outcomes of employees as shown in Figure 3.4.

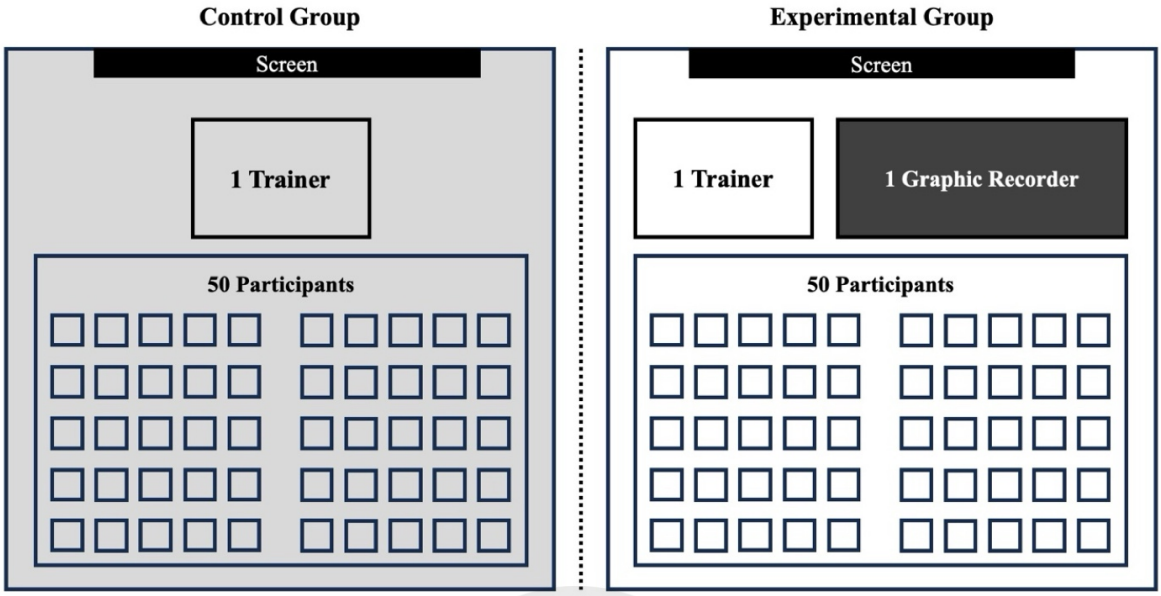
The first step involves a meticulous group assignment, where 100 participants are deliberately categorized into two distinct groups: the experimental group, undergoing training

with graphic recording, and the control group, receiving training without this visual aid. A critical constraint is imposed to ensure that all participants are at managerial-level positions within a company and have not previously undergone similar training content. A random assignment is followed when assigning participants to the experimental group and control group, allowing any observed differences in learning outcomes to be directly attributed to the introduction of graphic recording rather than inherent participant characteristics. Choosing 100 people from the company to participate is limited by the effectiveness of graphic recording. Participants must be able to see the notes throughout the training to ensure its effectiveness. Additionally, due to the nature of the in-house training program, it has generally around 50 people, which is the optimal classroom size to ensure trainees can fully benefit from the trainer's instruction (Donnell, 2018). More importantly, to enhance the solidity of the research design, additional control settings are implemented. The content, duration, environment, trainers, and participants' knowledge backgrounds are meticulously standardized between the two groups to isolate and measure the specific impact of the moderator.

For comprehensive data collection, two distinct instruments are employed. First, a post-training examination (Kirkpatrick's Level 2 - Learning) is administered to both groups to assess the training content's depth of understanding and retention. This examination serves as a quantitative measure of knowledge acquisition. Additionally, a survey (Kirkpatrick's Level 1 - Reaction) is distributed to participants in both groups to capture their immediate reactions and subjective responses to the training experience. This survey delves into participants' perceptions, attitudes, and satisfaction levels, providing qualitative insights into their reactions to the training.

Figure 3.4

Research Sample and Experimental Procedure



Manipulation Check

To affirm the success of the experimental manipulation involving the introduction of graphic recording in training sessions, this study conducts a manipulation check to see if graphic recording indeed helps trainees perceive a significantly lower information overload than when there is no graphic recording. Specifically, 100 participants were assigned to either the experimental group, undergoing training with graphic recording, or the control group, receiving training without this visual aid, employing strict random assignment and making sure both groups have an equal number of participants. After participants finished reading about the training content, they were asked about 5 questions by Costa et al. (2015) to assess their information overload perception. Hierarchical regression analysis was performed to check whether the experimental group revealed a significantly lower information overload perception than the control group.

Measurement

The questionnaires utilized in this study are adapted from prior research. The designed questionnaire consists of two primary sections. The initial section is an examination based on what is taught in the training with a total of 17 items: reaction (7 items) and learning (10 items). The subsequent section encompasses queries about participants' demographic information through a set of questions. Given that all questionnaire items were originally formulated in English, they underwent an initial translation into Thai by the author. Subsequently, the translated version is reviewed by two training company officers to ensure the accuracy of the translation process. For a detailed view of the completed questionnaires in both English and Thai, please refer to Appendix A and B, respectively.

Information Overload

Building upon a study from Jensen et al. (2014), Costa et al. (2015) contributed by shortening the original scale. Their decision to eliminate three elements out of the initially proposed eight demonstrates a nuanced understanding of the information overload construct. Notably, the exclusion of these items was driven by their perceived irrelevance to assessing the quantity of information. This study aligns with the refined scale developed by Costa et al. to examine the perceived information load during training for 5 items. Response options are based on a four-item scale that ranges from 1 = strongly disagree to 4 = strongly agree. (See Table 3.1).

The objective is to compare whether the experimental group perceives a lesser information load than the control group. In crafting questions related to information overload, certain terms have been refined to align more closely with the specifics of this study. The questions are outlined in Table 3.1:

Table 3.1

Information Overload Measurement

Code	Questions	Cronbach's Alpha
IO1	There are so many different recommendations about what to do, it's hard to know which ones to follow.	0.84
IO2	It has gotten to the point where I don't even care to hear new information about cancer.	
IO3	Information about the training all starts to sound the same after a while.	
IO4	I forget most training information right after I hear it.	
IO5	I feel overloaded by the amount of training information I am supposed to know.	

Note. Adapted from "The cancer information overload (CIO) scale: Establishing predictive and discriminant validity. Patient Education and Counseling" by Jensen, J. D., Carcioppolo, N., King, A. J., Scherr, C. L., Jones, C. L., & Niederdeppe, J., 2014, *Patient Educ Couns, 94*(1), p. 91. Copywrite 2014 by Elsevier.

Training Effectiveness

Level 1 – Reaction

By employing questionnaires to assess participants' reactions immediately after concluding the training, it utilized for assessing reactions during training delivery is adapted from Alsalamah and Callinan (2021). The items are evaluated on a Likert scale, ranging from '1' for strongly disagree to '5' for strongly agree, providing participants with response options

reflecting varying degrees of agreement or disagreement. The present research measure is presented in Table 3.2.

Table 3.2

Kirkpatrick's Training Effectiveness Level 1 – Reaction Measurement

Code	Questions	Cronbach's Alpha
R1	The trainer was an effective communicator with trainees	
R2	The trainer prepared the scientific material in an appropriate manner and in accordance with the objectives of the training programme.	
R3	The trainer prepared training activities appropriately and in accordance with the objectives of the training programme.	
R4	The trainer used appropriate training methods that were compatible with the course objectives.	0.89
R5	The trainer achieved the goals of the programme.	
R6	The trainer gave trainees an opportunity to discuss and ask questions.	
R7	The trainer was able to use available training equipment.	

Note. Adapted from "Adaptation of Kirkpatrick's Four-Level Model of Training Criteria to Evaluate Training Programmes for Head Teachers" by Alsalamah, A., & Callinan, C., 2021, *Education Sciences, 11*(3) 116, p.10. Copywrite 2021 by MDPI.

Level 2 – Learning

When evaluating learning and understanding, participants are often required to demonstrate their acquired knowledge. While many studies following the Kirkpatrick model rely on self-evaluation through surveys or interviews, our approach focuses on more tangible assessments, such as demonstrations or quizzes. This study conducts assessments through examinations, incorporating a mix of recall and understanding questions. The items are evaluated by 1 point per question. This method aims to evaluate participants' capacity to recall training content and grasp the underlying concepts. Although no predefined set of questions exists, the study adopts Bloom's taxonomy questions to align with the training content. These guidelines are detailed in Table 3.3. For the full research questions, see Appendix A.

Table 3.3

Kirkpatrick's Training Effectiveness Level 2 – Learning Measurement

	Which statement is…?
Remember	Which one is (not)…?
	What is the component of…?
Understand	What is the meaning of…?
	Why it is important to…?
	What should be done…?

Note. Adapted from "Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives" by Anderson, L. W., & Krathwohl, D. R., 2002, *Pearson Longman*.

Control Variable

To maintain consistency in elements like content complexity or recorder skill level, the study controls these variables to accurately assess the relationship between information overload and graphic recording effectiveness. Without control variables, confounding variables could change the results, leading to inaccurate conclusions.

Gender: Given the potential differences in cognitive processing and communication styles between genders, it may have distinct approaches to information processing and problem-solving (Johnson, 2004), which could impact how they engage with and interpret graphic recordings. In the present study, it is coded as 1 = female, 0 = male.

Age: Older individuals often possess extensive life experience and analytical skills that can aid in understanding complex information, with or without the aid of graphic recordings. However, age-related cognitive changes, such as working memory or processing speed declines, may still influence how older individuals navigate information overload. On the other hand, younger individuals may adapt to processing visual information quickly and navigating complex digital interfaces, potentially benefiting more from graphic recordings in synthesizing overwhelming information (Paepcke-Hjeltness & Lu, 2020, p.63).

Data Analysis

Following data collection, the numerical data is subjected to analysis using IBM SPSS Statistics 29 software. The examination of hypotheses involves the application of both descriptive and inferential statistical techniques, which are outlined as follows:

Descriptive Statistics Analysis

Descriptive statistics are employed to provide a comprehensive summary of the raw data related to the respondents' basic information. This analysis includes demographic

variables such as gender, age, tenure, and job position. Additionally, central tendency measures, including the mean, median, and mode, are calculated to understand the typical or central values of the dataset. The variation within the data is assessed through the computation of the standard deviation. This approach not only aids in a thorough summarization of demographic information that may influence the research outcomes but also enables the prediction anticipation of respondent characteristics by identifying any discernible patterns or trends (Vetter, 2017).

Pearson Correlation Analysis

Pearson's correlation coefficient, denoted as Person's, serves to quantify both the degree and direction of the linear association between two variables. The coefficient's value ranges from -1 to 0 to +1, with the sign indicating the direction of the relationship. Specifically, a positive sign signifies a positive relationship between the two variables, while a negative sign indicates a negative relationship. Furthermore, the numerical value denotes the strength of the relationship. A value closer to +1 or -1 suggests a stronger association between the variables, whereas a value of zero implies no discernible relationship between the two variables (Feng et al., 2018).

In the context of the present research, Pearson's r is employed to evaluate the strength of the linear relationship among information overload, training effectiveness, and graphic recording. This statistical tool aids in assessing the magnitude and direction of associations, contributing valuable insights into the interplay between the variables under investigation.

Hierarchical Regression Analysis

The analysis was employed to test the moderating effects of graphic recording on the relationships between information overload and training effectiveness. As it is widely used and a general strategy for exploring moderating effects, this approach allows for a systematic investigation of the relationships, contributing to a more nuanced understanding of the interplay between the studied variables (Richardson et al., 2015).

Reliability Analysis

Cronbach's alpha assesses the extent to which items within a measure are interrelated or correlated. High Cronbach's alpha values indicate strong internal consistency reliability, suggesting that the items consistently measure the same underlying construct. This is important because it ensures that the measure is stable and consistent across different administrations.

Although Cronbach’s alpha is not directly used to assess test-retest reliability, it indirectly supports it by indicating the stability of a measure over time. If Cronbach's alpha is high across multiple administrations of the same measure, it suggests that the measure is reliable and produces consistent results over time (Peters, 2014).

CHAPTER IV RESULTS AND DISCUSSION

This chapter presents the results of statistical analysis conducted using SPSS version 29, based on data collected from experiments involving manager-level employees in a Taiwanese factory in Thailand. The content consists of two sections: a result and a discussion. The initial segment commences with descriptive statistics, offering a comprehensive overview of respondent profiles. Pearson correlation analysis is employed to explore the extent and direction of linear association among information overload, training effectiveness, and graphic recording. The first section concludes with an examination of the moderating effect of graphic recording using hierarchical regression analysis. The subsequent section encompasses a synthesis and discussion of the analytical findings.

Descriptive Statistics

Table 4.1 displays the demographic information of the participants. The survey encompassed two demographic inquiries, covering gender and age, along with one query to ascertain if the trainee was new to the training. The study comprises a total of 100 participants occupying managerial positions. Gender distribution is relatively balanced, with a slight predominance of males (58%). The majority of participants fall within the age range of 30 to 50 years old (82%), followed by those under 30 (16%) and over 50 (2%). Nearly all participants (94%) had not previously received training on the topic covered in this study, while the remaining (6%) had received training, but they mostly forgot about the content.

Table 4.1

Participants Demographic Statistics

Variable	Category	Frequency	Percentage (%)
Gender	Female	42	42
	Male	58	58
Age (years)	<30	16	16
	30 but <40	41	41
	40 but <50	41	41
	50 and above	2	2
Experience in This Training	Never	94	94
	Yes, but 6 months ago	6	6

Note. N = 100

Results of Pearson Correlation Analysis

The study employed Pearson correlation analysis to assess the strength and direction of relationships among the variables under investigation. Table 4.2 outlines the descriptive statistics and correlation coefficients among gender, age, information overload, training effectiveness, and graphic recording.

The internal consistency reliability coefficient (Cronbach's Alpha) for information overload was found to be .88, for Kirkpatrick's training effectiveness level 1: reaction is .915, and for Kirkpatrick's training effectiveness level 2: learning is .796. All values exceeded .70, indicating acceptable and reliable internal consistencies of the measurements.

As presented in the table, coefficients ranged from -.575 to .221. Notably, information overload exhibited negative correlations with both training effectiveness in learning (r=-.359, p=<.01) and learning (r= -.575, p=<.01). These findings suggest that trainees experiencing higher information overload are less engaged in the training and have a poorer understanding

of the context. Furthermore, a positive correlation was observed between reaction and learning (r=.484, p=<.01) implying that heightened engagement with the training corresponds to higher performance on learning assessments.

In summary, the independent variables (information overload:) displayed significant correlations with the dependent variable (Kirkpatrick's training effectiveness level 1 reaction and level 2 learning). Conversely, among demographic variables (gender and age), only age exhibited a significant association with learning acquisition during training, indicating that older participants tend to grasp training content more effectively.

These correlation results indicate the direction and strength of associations between variables. Nonetheless, further investigation through hierarchical regression analysis is warranted to ascertain whether changes in independent variables.

Table 4.2

Means, Standard Deviations, Reliabilities Coefficients, and Correlations (N=100)

	Mean	SD	1	2	3	4	5
1. Gender	.42	.496					
2. Age	38.37	7.172					
3. Information Overload	2.33	.959	.078	-.105	(.880)		
4. Learning (Level 2)	6.90	2.676	-.113	.221*	-.575**	(.796)	
5. Reaction (Level 1)	4.32	0.598	.072	.178	-.359**	.484**	(.915)

Note. N = 100, Numbers in parentheses represent Cronbach's alpha value. *p< .05. **p< .01.

Code. Gender: 1 = Female, 0 = Male, Training: 1 = Without Graphic Recording, 2 = With Graphic Recording.

Result of Hierarchical Regression Analysis

This section presents the outcomes of the regression analysis conducted to validate the three hypotheses proposed in this study. The study conducts the hierarchical regression to ascertain the presence of relationships among the independent variables, moderating variable, and dependent variables.

Hypothesis 1 posited that information overload is associated with Kirkpatrick's training effectiveness level 1: reaction. The hierarchical regression analysis results for Hypothesis 1 are summarized in Table 4.3. Two steps were undertaken in the hierarchical regression analysis. Firstly, gender and age were controlled for in Model 1. Subsequently, in Model 2, the independent variable, information overload, was introduced.

The analysis revealed that 12.1% of the total variance in reaction could be accounted for by information overload (F=5.916, p<.001). Information overload demonstrated a significant negative relationship with Kirkpatrick's training effectiveness level 1: reaction (β= -.352, p< .001). Consequently, Hypothesis 1 is supported.

Table 4.3

Hierarchical Regression Analysis of Information Overload on Reaction

Variable	β	
	1	2
Step 1		
Gender	.055	.086
Age	.173	.133
Step 2		
Information overload		-.352***
F	1.742	5.916***
R^2	.035	.156***
$Adj.\ R^2$	.015	.130***
ΔR^2	.035	.121***
ΔF	1.742	13.804***

Note. N = 100, Dependent variable = Reaction; ***p <.001.

Hypothesis 2 put forward that information overload negatively impacts Kirkpatrick's training effectiveness level 2: learning. The findings from the hierarchical regression analysis are outlined in Table 4.4. The analysis followed the same steps as Hypothesis 1.

The result of the analysis showed that 29.7% of the total variances in learning intention can be explained by information overload. (F=18.281, p<.001). A significant relationship was observed between information overload and Kirkpatrick's training effectiveness level 2: learning (β=-.550, p<.001). Hence, Hypothesis 2 is supported.

Table 4.4

Hierarchical Regression Analysis of Information Overload on Learning

Variable	β	
	1	2
Step 1		
Gender	-.135	-.086
Age	.234	.171
Step 2		
Information overload		-.550***
F	3.474	18.281***
R^2	.067	.364***
Adj. R^2	.048	.344***
ΔR^2	0.67	.297***
ΔF	3.474	44.759***

Note. N = 100, Dependent variable = Learning; ***p <.001.

Hypothesis 3 proposed that the relationship between information overload and the Kirkpatrick's training effectiveness level 1: reaction could be influenced by the presence of graphic recording. In simpler terms, when there's a lot of information to handle, using graphic recording might make the reaction to training less affected. To test this hypothesis, the hierarchical regression analysis is applied to examine this moderating effect.

The analytical process conducted across three stages. Firstly, in Model 1, the potential influence of demographic factors such as gender and age were controlled. Subsequently, in Model 2, the variables of interest, namely information overload and reaction, were introduced. Lastly, in Model 3, the interaction term between information overload and reaction was incorporated to explore its potential moderating effect.

The findings, as shown in Table 4.5, reveal that the interaction term in Model 3 ($\Delta R^2 = 0.069$, $p < .05$), significantly presents how graphic recording influences the relationship between information overload and Kirkpatrick's training effectiveness level 1: reaction.

Table 4.5

Hierarchical Regression Analysis on the Moderating Effect on Reaction

Variable	*β*		
	1	2	3
Step 1			
Gender	.055	.079	.076
Age	.173	.136	.029
Step 2			
Information overload		-.260**	-1.114***
Graphic recording		.463***	-.239
Step 3			
Information overload x Graphic recording			1.025***
F	1.742	11.102***	9.826***
R^2	.035	.362***	.431***
Adj. R^2	-.015	.336***	.401***
ΔR^2	.035	.328***	.069***
ΔF	1.742	24.409***	11.324***

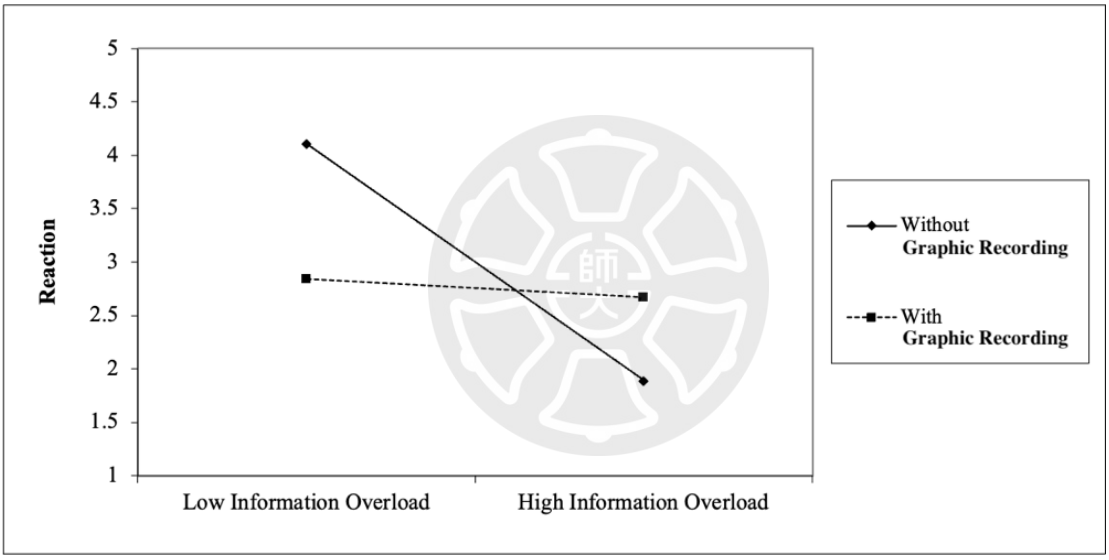
Note. N=100, Dependent variable = Reaction; **p <.01. ***p <.001.

To illustrate the impact of the moderator more thoroughly, the interaction effect was visualized in Figure 4.1 to examine differences in slopes. This figure shows that when graphic recording is employed, trainees can remain engaged with the training even in

situations of high information overload. Contradictory, it is evident that when confronted with high levels of information overload, the decline in reaction is more gradual for trainees who perceive the absence of graphic recording, as indicated by the steep line. Consequently, the findings suggest that graphic recording mitigates the negative influence of information overload on Kirkpatrick's training effectiveness level 1: reaction. Therefore, Hypothesis 3 is supported.

Figure 4.1

Interaction Plot for the Moderating Effect of Graphic Recording on Reaction



Hypothesis 4 proposed that the relationship between information overload and Kirkpatrick's training effectiveness level 2: learning could be influenced by the presence of graphic recording. In essence, the hypothesis suggests that the use of graphic recording may uphold the learning process even in scenarios characterized by high information load. Hierarchical regression analysis was utilized, following the same analytical procedure employed in Hypothesis 3.

The outcomes, shown in Table 4.6, disclose that the interaction term in Model 3 ($\Delta R^2 = .106$, $p < .05$), significantly presents how graphic recording influences the relationship between information overload and Kirkpatrick's training effectiveness level 2: learning.

Table 4.6

Hierarchical Regression Analysis on the Moderating Effect on Learning

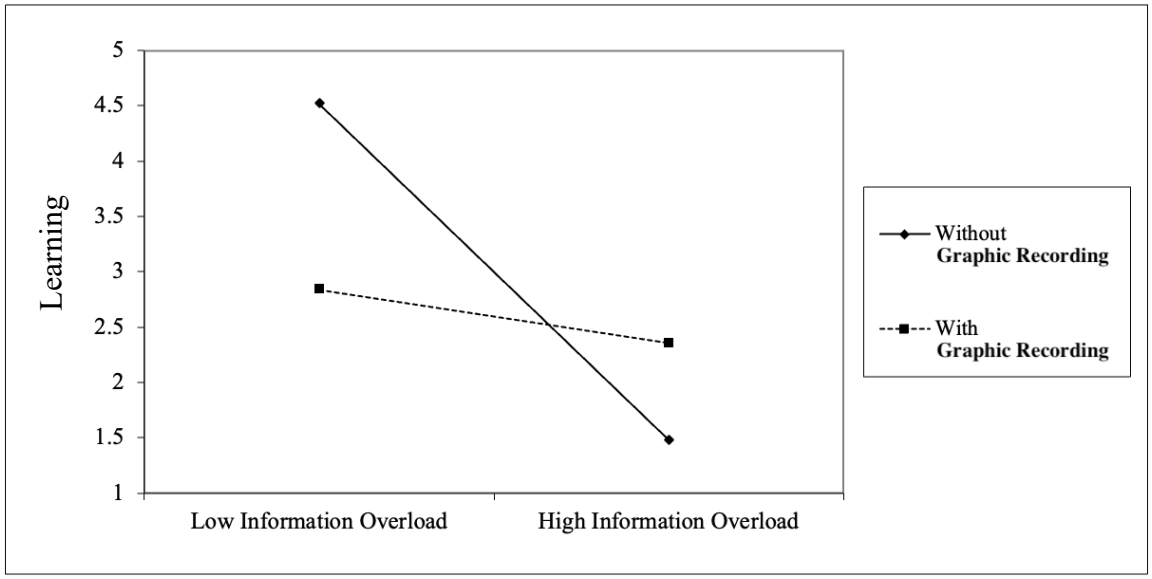
Variable	β		
	1	2	3
Step 1			
Gender	-.135	-.094	-.097
Age	.234**	.175*	.042
Step 2			
Information Overload		-.456***	-1.520***
Graphic Recording		.471***	-.404*
Step 3			
Role overload x Interactional justice			1.276***
F	3.474*	32.338***	40.481***
R^2	.259*	.759***	.826***
Adj. R^2	.048*	.559***	.666***
ΔR^2	.067*	.510***	.106***
ΔF	3.474*	57.177***	31.510***

Note. N=100, Dependent variable = Learning; *p <.05. **p <.01. ***p <.001.

To better understand the impact of the moderator, Figure 4.2 visually portrays the interaction effect to compare variations in slopes. This illustration demonstrates that when graphic recording is utilized, trainees can sustain their engagement with the training even when confronted with high levels of information overload, similar to what was observed in training effectiveness level 1: reaction, as indicated by the steep line. As a result, the findings imply that graphic recording alleviates the negative impact of information overload on training effectiveness level 2: learning. Therefore, Hypothesis 4 is supported.

Figure 4.2

Interaction Plot for the Moderating Effect of Graphic Recording on Learning



Discussions

Exploring the connection between information overload, training effectiveness, and graphic recording is the primary objective of this study. In this section, the findings pertaining to all hypotheses are thoroughly examined, along with potential explanations and implications. A summary of the results from hypothesis testing is provided in Table 4.7.

Table 4.7
Hypotheses Testing Results Summary

	Hypotheses	Result
H1	Information overload has a negative impact on the trainees' reactions, and reduces Kirkpatrick's training effectiveness Level 1	Supported
H2	Information overload has a negative impact on the trainees' learning, and reduces Kirkpatrick's training effectiveness Level 2	Supported
H3	Graphic recordings weaken the negative relationship information overload on the trainees' reactions	Supported
H4	Graphic recordings weaken the negative relationship information overload on the trainees' learning	Supported

Effect of Information Overload on Training Effectiveness

The findings of this study hold considerable outcomes regarding the impact of information overload during training sessions. Theoretically, a primary finding underscores the relevance of information overload to the initial levels of Kirkpatrick's training effectiveness, namely, reaction and learning, revealing a negative association. This finding aligns with the existing literature discussed in Chapter 2, which suggests that individuals often struggle when faced with the task of processing and accessing excessive information, both in professional settings and in daily life (Arnold et al., 2023; Belabbes et al., 2022; Eppler & Mengis, 2004; Moko et al., 2023; Roetzel, 2018; Yu et al., 2023).

According to cognitive load theory, individuals have limited cognitive resources, and when these resources are exceeded by the demands of a task, performance suffers (Sweller, 1988). When confronted with excessive information during training, individuals experience cognitive overload, leading to comprehension and retention of the material being presented. Information's high volume and complexity overwhelm cognitive processing capacities,

making it difficult for trainees to encode information effectively. Consequently, this can impede learning outcomes and hinder the acquisition of new knowledge and skills.

Moreover, when trainees feel overwhelmed and unable to effectively process the information being presented, they may disengage from the training altogether. This can lead to a loss of intention and interaction with the training material, as trainees struggle to maintain focus and attention amidst the deluge of information. Instead, they may seek refuge or disengage mentally from the training session, resulting in diminished learning outcomes.

Additionally, the forgetting curve, as proposed by Hermann Ebbinghaus, illustrates how newly acquired information decays over time if not reinforced through practice or repetition (Ebbinghaus, 1885). In the context of information overload during training, the forgetfulness induced by overwhelming amounts of information may hinder long-term retention and application of learning.

A training session is typically hosted by businesses for a full day instead of shorter sessions spread over several days. The prolonged length of the training overwhelms participants, leading to a diminished sense of enjoyment and an increased likelihood of cognitive overload. As a result, trainees may reach a point where they shut down mentally, hindering their ability to absorb and retain information effectively. “Afternoon slump” is characterized by decreased alertness, from comparing the level of engagement of participants during the morning and the afternoon session of this experiment.

Moderating Effect of Graphic Recording

Building upon prior research, graphic recording involves the visual representation of ideas, concepts, and discussions through drawings, diagrams, and visual aids. By condensing complex information into visually digestible formats, graphic recording can help trainees

better understand and retain key concepts, even in the face of information overload (Khairat et al. 2018; Paepcke-Hjeltness et al., 2017).

Although numerous studies have attested to the efficacy of graphic recording based on trainee feedback and perceptions, the present study extends this inquiry through a quantitative approach. Supported by a study Roy et al. (2017), it proposed utilizing similar solutions to aid decision-making processes for board members using summarizing, providing expert commentary, prioritizing, distributing information over time, and visualizing data. Moreover, Roetzel's (2018) systematic review introduces a new framework for structuring issues related to information overload mentioning that Chan (2001) and Meyer (1998) offer solutions to filter information and enhance visualization as well.

The ability of perceived graphic recording to mitigate the relationship between information overload and training effectiveness can be explained by various factors. Firstly, in line with the visualization theory (Paivio & Csapo, 1973), individuals' cognitive processing of information is influenced by their capacity to mentally visualize and comprehend complex concepts. Visual representations condense intricate information into easily digestible formats, facilitating understanding and retention among participants (Johnson, 2004).

Secondly, graphic recording fosters active engagement and participation among trainees by offering a visually stimulating and interactive learning environment. Participants are more likely to remain engaged and attentive when information is presented visually, anticipating how the trainer will depict concepts graphically.

Last and foremost, the organization and coherence provided by visual structures aid participants in making sense of presented information, reducing feelings of confusion and overwhelm associated with information overload. As a final point, based on researcher’s experience during the data collection observation, participants who can visually grasp

complex concepts feel more empowered to actively engage and answer from the material and are eager to apply and teach their newfound learning in real-world scenarios.

CHAPTER V CONCLUSIONS AND RECOMMENDATIONS

Continuing from the preceding chapter, which detailed the outcomes of data analysis within the established framework, this chapter analyzes and summarizes the conclusions derived from the present research study. Subsequently, practical implications and limitations are carefully examined to provide a comprehensive understanding. Finally, the chapter concludes by offering recommendations for future research endeavors in the academic domain.

Conclusion

The primary aim of this study is to explore the potential of graphic recording in reducing information overload and improving training effectiveness. It is anticipated that implementing graphic recording techniques will enhance learning retention outcomes in training and enhance engagement levels. This is particularly important given the prevalent issue of training sessions often failing to yield lasting impacts, with participants struggling to recall information post-session or feeling overwhelmed even when provided with training materials for review.

To examine the effectiveness of graphic recording, an empirical experiment was conducted involving 100 managers from a Taiwanese jewelry company in Thailand of whom had a similar engineering background. These participants were divided into two groups and subjected to a one-day training session, after which their learning was tested.

Initial data analysis regarding Hypotheses 1 and 2 revealed a negative correlation between information overload and training effectiveness, specifically in terms of participants' reactions (Kirkpatrick’s level 1) and learning (Kirkpatrick’s level 2). This finding aligns with the cognitive load theory, which explains how the human brain has a limited capacity to

process and retain information. Furthermore, it resonates with the forgetting curve theory, which suggests that information is rapidly forgotten over time if not reinforced.

Furthermore, the core objective of this study is to evaluate the efficacy of graphic recording, yielding highly significant results for Hypotheses 3 and 4. Graphic recording was found to significantly reduce information overload while enhancing training effectiveness in engagement and learning acquisition. This finding is in line with the visualization theory, which asserts that individuals can better comprehend and retain information when presented visually.

Practical Implication of the Study

Based on its findings, this study provides several practical implications for trainers and practitioners in the fields of human resource management and education.

1. **Modular Training Approach:** To address the possible issue of information overload during the training, instead of one-day training, organizations should break down content into smaller, more digestible modules. By offering training sessions in shorter, more focused intervals, participants can engage with the material more effectively and retain key concepts over time. This approach allows participants to focus on specific topics or skills that are most relevant to their roles, leading to more targeted and impactful learning experiences.
2. **Implementing graphic recording techniques in training sessions:** If training has to be long because of the budget or availability of the trainer and trainee, implementing graphic recording can lead to higher levels of engagement and a better understanding of training content. Trainers can create more effective learning experiences for participants by mitigating information overload during training sessions.

3. **Cost-Effective Training Solutions**: Incorporating graphic recordings into training programs can offer cost-effective solutions for organizations seeking to maximize the impact of their training investments. Organizations achieve better ROI on their training initiatives by improving overall training effectiveness, ultimately contributing to improved organizational performance and success.
4. **Tailored Learning Experiences:** Graphic recording allows trainers to customize learning experiences to better meet participants' needs. By visually organizing information and highlighting key points, trainers can tailor training content to align with participants' learning styles and preferences, ultimately enhancing the overall effectiveness of the training program.

Limitation

While the present study has produced significant results on the reasons why graphic recording can be useful during training, several limitations need to be acknowledged.

Firstly, despite the universality of visual language and intentionally targeted participants with limited interest in artistic endeavors, namely those in the engineering field, the experiment still collected data exclusively from managers employed by a Taiwanese jewelry company in Thailand. Furthermore, the limited sample size within the two samples raises concerns regarding the generalizability of the findings. Consequently, with a small sample size, the results may not accurately represent the broader population, limiting the applicability of the study's conclusions. In other words, the findings may lack generalizability to other countries or cultural settings.

Secondly, the study’s focus on short-term training outcomes, immediately assessed after the training, overlooks the long-term retention and application of learning. The study provides limited insights into the enduring benefits of utilizing graphic recording in training.

Recommendation

For future research, three potential explorations to further advance the effectiveness of graphic recording could be:

Firstly, examining the diverse layouts and styles associated with graphic recording could shed light on their effectiveness. As mentioned, graphic recording is up to the graphic recorder's style. Research could aim to understand how different layout designs contribute to the overall effectiveness in facilitating comprehension and retention of information.

Secondly, investigating how varying amounts of information or time impact the efficacy of graphic recording could provide valuable insights. Graphic recording can condense complex content into easily digestible formats, potentially leading to more substantial learning outcomes than conventional reports. Exploring this relationship across different information densities could bolster or suggest when we should incorporate graphic recording into educational or professional contexts.

Thirdly, future research can consider adopting a longitudinal design to investigate whether graphic recording also benefits long-term retention and application of learning, as opposed to the benefit of short-term training outcomes found in this study.

Lastly, conducting this study hypotheses across various settings, including different types of businesses, work environments, and cultural contexts, could provide valuable insights and broaden the research scope. Additionally, given the increasing prevalence of online training platforms, incorporating graphic recording into digital modules could offer an effective means of delivering content. Online platforms are accessible to see graphic recordings easily and engaging, making them well-suited for preventing trainees from feeling bored.

REFERENCES

Achuthan, K., Kolil, V. K., & Jyothy, S. N. (2023). Effectiveness of virtual laboratory teacher training workshops: a Kirkpatrick model analysis. *International Journal of Emerging Technologies in Learning (IJET)*, *18*(15), 225–239. https://doi.org/10.3991/ijet.v18i15.40037

Agerbeck, B. (2012). *The graphic facilitator's guide: How to use your listening, thinking & drawing skills to make meaning*. Chicago: Loosetooth.

Ahern, C. A., & De Kirby, K. (2011). *Beyond individual differences*. Springer Science & Business Media. https://doi.org/10.1007/978-1-4614-0641-9

Aik, C. T., & Tway, D. C. (2005). On-the-job training: An overview and an appraisal. *Proceedings of the international conference on applied management and decision sciences (AMDS 2005): Building a research agenda for the 21st century,* 107–120.

Alken, A., Luursema, J. M., Weenk, M., Yauw, S., Fluit, C., & van Goor, H. (2018). Integrating technical and non-technical skills coaching in an acute trauma surgery team training: Is it too much? *The American Journal of Surgery*, *216*(2), 369–374. https://doi.org/10.1016/j.amjsurg.2017.08.011

Alsalamah, A., & Callinan, C. (2021). Adaptation of Kirkpatrick's four-level model of training criteria to evaluate training programmes for head teachers. *Education Sciences*, *11*(3), 116. https://doi.org/10.3390/educsci11030116

Anderson, L. W., & Krathwohl, D. R. (2001). *Taxonomy for learning, teaching, and assessing: A revision of bloom's taxonomy of educational objectives*. Pearson Longman.

Araújo, S., Domingues, M., & Fernandes, T. (2022). From hand to eye: a meta-analysis of the benefit from handwriting training in visual graph recognition. *Educational Psychology Review*, *34*(3), 1577–1612. https://doi.org/10.1007/s10648-021-09651-4

Arnold, M., Goldschmitt, M., & Rigotti, T. (2023). Dealing with information overload: a comprehensive review. *Frontiers in Psychology*, 14: 1122200. https://doi.org/10.3389/fpsyg.2023.1122200

Arzaga, J. (2023). Sketchnoting: A pedagogical tool in the delivery of printed modular distance learning. *American Journal of Multidisciplinary Research and Innovation*, *2*(3), 77–82. https://doi.org/10.54536/ajmri.v2i3.1625

Bafaneli, S., & Setibi, G. (2015). The impact of on-the-job training on employee performance: The case of Riley's hotel. *Journal of Business Theory and Practice*, *3*(2), 239. https://doi.org/10.22158/jbtp.v3n2p239

Barrett, A., & O'Connell, P. J. (2001). Does training generally work? The returns to in-company training. *Industrial and Labor Relations Review*, *54*(3), 647-662. https://doi.org/10.2307/2695995

Bates, R. (2004). A critical analysis of evaluation practice: the Kirkpatrick model and the principle of beneficence. *Evaluation and Program Planning*, *27*(3), 341–347. https://doi.org/10.1016/j.evalprogplan.2004.04.011

Bawden, & Robinson. (2018). Information overload: An overview. *Oxford Encyclopedia of Political Decision Making*. https://openaccess.city.ac.uk/id/eprint/23544/

Belabbes, M. A., Ruthven, I., Moshfeghi, Y., & Rasmussen Pennington, D. (2022). Information overload: a concept analysis. *Journal of Documentation*, *79*(1), 144–159. https://doi.org/10.1108/jd-06-2021-0118

Benselin, J. C., & Ragsdell, G. (2016). Information overload: The differences that age makes. *Journal of Librarianship and Information Science*, *48*(3), 284–297. https://doi.org/10.1177/0961000614566341

Bettis-Outland, H. (2012). Decision-making's impact on organizational learning and information overload. *Journal of Business Research*, *65*(6), 814–820. https://doi.org/10.1016/j.jbusres.2010.12.021

Blair, A. (2003). Reading strategies for coping with information overload ca. 1550-1700. *Journal of the History of Ideas*, *64*(1), 11-28. https://doi.org/10.2307/3654293

Bliss, R. (2023, January). *Flattening The Forgetting Curve*. Retrieved October 18, 2023, from https://www.linkedin.com/pulse/flattening-forgetting-curve-richard-bliss/

Blume, B. D., Ford, J. K., Baldwin, T. T., & Huang, J. L. (2009). Transfer of training: a meta-analytic review. *Journal of Management*, *36*(4), 1065–1105. https://doi.org/10.1177/0149206309352880

Borkovich. (2018). Information overload revisited: Infinite organizational threats. *Issues in Information Systems*. https://doi.org/10.48009/4_iis_2018_150-161

Bratash, V. S., Riekhakaynen, E. I., & Petrova, T. E. (2020). Creating and processing sketchnotes: a psycholinguistic study. *Procedia Computer Science*, *176*, 2930–2939. https://doi.org/10.1016/j.procs.2020.09.210

Brown, T. C. (2005). Effectiveness of distal and proximal goals as transfer-of-training interventions: A field experiment. *Human Resource Development Quarterly*, *16*(3), 369–387. https://doi.org/10.1002/hrdq.1144

Camargo, M. R. (2008). A grounded theory study of the relationship between e-mail and burnout. *Information Research*, *13*(4), paper 383.

Cameron, B. G. (2019). *Customer confusion: product overlap, ambiguous needs, and information overload : an examination of corporate mental models for derivative product creation and their impact on customers*. HRL.Handle. Retrieved October 22, 2023, from https://hdl.handle.net/1721.1/122243

Cawley, J. F. (2020). Formal training for practice: how much is too much? *Academic Medicine*, *95*(7), 972–972. https://doi.org/10.1097/acm.0000000000003362

Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, *8*(4), 293–332. https://doi.org/10.1207/s1532690xci0804_2

Chan, S.Y. (2001). The use of graphs as decision aids in relation to information overload and managerial decision quality. *Journal of Information Science*, 27(6), 417-425. https://doi.org/10.1177/016555150102700607.

Cheng, P., Ouyang, Z., & Liu, Y. (2019). The effect of information overload on the intention of consumers to adopt electric vehicles. *Transportation*, *47*(5), 2067–2086. https://doi.org/10.1007/s11116-019-10001-1

Cheung, V. K., Chia, N. H., So, S. S., Ng, G. W., & So, E. H. (2023). Expanding scope of Kirkpatrick model from training effectiveness review to evidence-informed prioritization management for cricothyroidotomy simulation. *Heliyon*, *9*(8), e18268. https://doi.org/10.1016/j.heliyon.2023.e18268

Cordiner, S. (2021). *5 things you can do if you have too much content for your online course*. eLearning Industry. Retrieved October 29, 2023, from https://elearningindustry.com/too-much-content-for-your-online-course-5-things-can

Costa, D. S., Smith, A. B., Lim, B. T., & Fardell, J. E. (2015). Simplifying the assessment of cancer information overload: A comment on Jensen et al. (2014). *Patient Education and Counseling*, *98*(11), 1450. https://doi.org/10.1016/j.pec.2015.04.020

De Jong, T. (2009). Cognitive load theory, educational research, and instructional design: some food for thought. *Instructional Science*, *38*(2), 105–134. https://doi.org/10.1007/s11251-009-9110-0

Dean-Coffey, J. (2013). Graphic recording. *New Directions for Evaluation*, *2013*(140), 47–67. https://doi.org/10.1002/ev.20073

Denny, J. (2021, May). *What is the forgetting curve (and how do you combat it)?* eLearning Industry. Retrieved October 10, 2023, from https://elearningindustry.com/forgetting-curve-combat

Dermol, V., & Čater, T. (2013). The influence of training and training transfer factors on organisational learning and performance. *Personnel Review*, *42*(3), 324–348. https://doi.org/10.1108/00483481311320435

DiCarlo, S. E. (2009). Too much content, not enough thinking, and too little FUN! *Advances in Physiology Education*, *33*(4), 257–264. https://doi.org/10.1152/advan.00075.2009

Dimeo, R. (2016). Sketchnoting: an analog skill in the digital age. *ACM SIGCAS Computers and Society*, *46*(3), 9–16. https://doi.org/10.1145/3024949.3024951

Dimeo, R. (2017). Sketchnote summary of "The backscattering story: A personal view." *Journal of Neutron Research*, *19*(3–4), 103–105. https://doi.org/10.3233/jnr-160030

Dimeo, R. (2021). Sketchnoting science how to make sketchnotes from technical content. *NIST Special Publication*, *1265*. https://doi.org/10.6028/nist.sp.1265

Donnell, R. O. (2018, March 6). *Why traditional classroom training isn't enough for today's employees*. HR Dive. Retrieved October 18, 2023, from https://www.hrdive.com/news/why-traditional-classroom-training-isnt-enough-for-todays-employee/518229/

Ebbinghaus. H. (1885). *Memory: A contribution to experimental psychology*. Leipzig, Duncker & Humblot.

Eppler, M. J., & Mengis, J. (2004). The concept of information overload: A review of literature from organization science, accounting, marketing, MIS, and Related Disciplines. *The Information Society*, *20*(5), 325–344. https://doi.org/10.1080/01972240490507974

Farjad, S. (2012). The evaluation effectiveness of training courses in university by Kirkpatrick model (Case Study: Islamshahr University). *Procedia - Social and Behavioral Sciences*, *46*, 2837–2841. https://doi.org/10.1016/j.sbspro.2012.05.573

Feng, W., Zhu, Q., Zhuang, J., & Yu, S. (2018, January 3). An expert recommendation algorithm based on Pearson correlation coefficient and FP-growth. *Cluster Computing*, *22*(S3), 7401–7412. https://doi.org/10.1007/s10586-017-1576-y

Fernández-Fontecha, A., O'Halloran, K. L., Tan, S., & Wignell, P. (2018). A multimodal approach to visual thinking: the scientific sketchnote. *Visual Communication*, *18*(1), 5–29. https://doi.org/10.1177/1470357218759808

Filipovic, T. (2021, Jun). *Three ways to evaluate learning beyond the smile sheet.* EnCompass LLC. Retrieved October 20, 2023, from https://encompassworld.com/three-ways-to-evaluate-learning-beyond-the-smile-sheet/

Ford, J. K., Yelon, S. L., & Billington, A. Q. (2011). How much is transferred from training to the job? The 10% delusion as a catalyst for thinking about transfer. *Performance Improvement Quarterly*, *24*(2), 7–24. https://doi.org/10.1002/piq.20108

Gandomkar (2018). Comparing Kirkpatrick's original and new model with CIPP evaluation model. *Journal of Advances in Medical Education & Professionalism*, *6*(2). 94–95.

Gerjets, P., & Scheiter, K. (2003). Goal configurations and processing strategies as moderators between instructional design and cognitive load: Evidence from hypertext-based instruction. *Educational Psychologist*, *38*(1), 33–41. https://doi.org/10.1207/s15326985ep3801_5

Gharravi, A. M. (2018). Impact of instructor-provided notes on the learning and exam performance of medical students in an organ system-based medical curriculum. *Advances in Medical Education and Practice*, *9*, 665–672. https://doi.org/10.2147/amep.s172345

Gibbons, A. (1991). Too much training is a waste of time – but it needn't be. *Industrial and Commercial Training*, *23*(5), 17-20. https://doi.org/10.1108/00197859110138539

Goh, W. W., Wong, S. Y., & Ayub, E. (2017). The effectiveness of MOOC among learners based on Kirkpatrick's model. *Redesigning Learning for Greater Social Impact*, 313–323. https://doi.org/10.1007/978-981-10-4223-2_29

Grannis, R. (2020, April). *Is Information Overload Killing Your Product Training?* www.linkedin.com. Retrieved October 18, 2023, from https://www.linkedin.com/pulse/information-overload-killing-your-product-training-roger-grannis/

Gross, B. M. (1964). *The Managing of Organizations*. The Free Press of Glencoe.

Hamtini, T. M. (2008). Evaluating E-learning Programs: An Adaptation of Kirkpatrick's Model to Accommodate E-learning Environments. *Journal of Computer Science*, *4*(8), 693–698. https://doi.org/10.3844/jcssp.2008.693.698

Haugh, & Macfarlan. (2020, February). *Talking about visuals: A discussion with graphic recorder Katherine Haugh - Blog post on Better Evaluation*. Better Evaluation. Retrieved October 18, 2023, from https://www.betterevaluation.org/blog/talking-about-visuals-discussion-graphic-recorder-katherine-haugh

Hristov, H., & Arcelus-Ulibarrena, J. M. (2023). Evolution of training methodology in the era of software technologies. *Research Highlights in Science and Technology 3*, 184–198. https://doi.org/10.9734/bpi/rhst/v3/5872e

Huang. (2017, April). Ethics and Expectations: How much work can/should a graphic facilitator/ graphic recorder be reasonably expected to deliver in a day? LinkedIn. Retrieved October 18, 2023, from https://www.linkedin.com/pulse/ethics-expectations-how-much-work-canshould-graphic-kailin-huang/

Ink Factory. (2023). *What is graphic recording? visual note-taking and more*. Retrieved October 18, 2023, from https://inkfactorystudio.com/blog/what-is-graphic-recording/

Irber, W. (2021). *Why our brain makes graphic recording at events less impactful than promised*. https://www.linkedin.com/pulse/why-our-brain-makes-graphic-recording-events-less-impactful-irber

Ismael (2020). *What's the difference between training and learning?* Retrieved November 4, 2023, from https://www.linkedin.com/pulse/whats-difference-between-training-learning-ismael-mba-cplp-pct/

Jensen, J. D., Carcioppolo, N., King, A. J., Scherr, C. L., Jones, C. L., & Niederdeppe, J. (2014). The cancer information overload (CIO) scale: Establishing predictive and discriminant validity. *Patient Education and Counseling*, *94*(1), 90–96. https://doi.org/10.1016/j.pec.2013.09.016

Johnson, C. (2004). Top scientific visualization research problems. *IEEE Computer Graphics and Applications*, *24*(4), 13–17. https://doi.org/10.1109/mcg.2004.20

Jones, C., Fraser, J., & Randall, S. (2018). The evaluation of a home-based paediatric nursing service: concept and design development using the Kirkpatrick model. *Journal of Research in Nursing*, *23*(6), 492–501. https://doi.org/10.1177/1744987118786019

Jonny, J. (2016). Training effectiveness at PT XYZ using Kirkpatrick model and return on investment of training (ROI-training). *Binus Business Review*, *7*(2), 137-141. https://doi.org/10.21512/bbr.v7i2.1728

Kaban, L. M., & Amanda, J. (2022). The importance of employees' motivation and training on company performance in a family business. *Ultima Management: Jurnal Ilmu Manajemen*, 83–96. https://doi.org/10.31937/manajemen.v14i1.2371

Khairat, S. S., Dukkipati, A., Lauria, H. A., Bice, T., Travers, D., & Carson, S. S. (2018). The impact of visualization dashboards on quality of care and clinician satisfaction:

Integrative literature review. *JMIR Human Factors*, *5*(2), e22. https://doi.org/10.2196/humanfactors.9328

Kidd. (2021, February). *Does your training give your team information overload? - Trainual*. Retrieved October 18, 2023, from https://trainual.com/manual/does-your-training-give-your-team-information-overload

Kingman Ink. (2023). *Rates for graphic recording — Kingman Ink visual notetaking*. Kingman Ink Visual Notetaking. Retrieved October 18, 2023, from https://kingmanink.com/rates

Kirkpatrick Partners. (2022, October). *The Kirkpatrick model*. Kirkpatrick Partners, LLC. Retrieved November 4, 2023, from https://www.kirkpatrickpartners.com/the-kirkpatrick-model/

Kirkpatrick, D. L., & Kirkpatrick, J. D. (2005, May 15). *Transferring Learning to Behavior*. National Geographic Books.

Larkin, V. (2023). Joseph Beuys and live scribing: A speculative timeline. *Journal of Illustration. 10*(1), 33-55. https://doi.org/10.1386/jill_00056_1

Lewis, M., & Sturdee, M. (2023). The joy of sketch: A hands-on introductory course on sketching in hci and ux within research, practice, and education. *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems*. https://doi.org/10.1145/3544549.3574187

Liu, Y., Luo, W., & Wang, X. (2023). Exploring the relationship between students' note-taking and interpreting quality: a case study in the Chinese context. *Frontiers in Education*, *8*. 268-281. https://doi.org/10.3389/feduc.2023.1157509

Lopatovska, I., Carcamo, T., Dease, N., Jonas, E., Kot, S., Pamperien, G., Volpe, A., & Yalcin, K. (2018). Not just a pretty picture part two: testing a visual literacy program

for young children. *Journal of Documentation*, *74*(3), 588–607. https://doi.org/10.1108/jd-08-2017-0119

Mayer, R. E. (2002). Rote versus meaningful learning. *Theory Into Practice*, *41*(4), 226–232. https://doi.org/10.1207/s15430421tip4104_4

McCall. (2020, January). *Compliance training in the age of information overload*. Training Industry. Retrieved November 15, 2023, from https://trainingindustry.com/articles/compliance/compliance-training-in-the-age-of-information-overload/

McGarry, O. (2022, April). *5 ways to challenge the forgetting curve*. LearnUpon. Retrieved October 18, 2023, from https://www.learnupon.com/blog/ebbinghaus-forgetting-curve/

Meyer, J. (1998). Information overload in marketing management, *Marketing Intelligence & Planning*, *16*(3), 200-209. https://doi.org/10.1108/02634509810217318

Misra, S., Roberts, P., & Rhodes, M. (2020). Information overload, stress, and emergency managerial thinking. *International Journal of Disaster Risk Reduction*, *51*, 101762. https://doi.org/10.1016/j.ijdrr.2020.101762

Mohammed, M., Sha'aban, A., Jatau, A. I., Yunusa, I., Isa, A. M., Wada, A. S., Obamiro, K., Zainal, H., & Ibrahim, B. (2021). Assessment of COVID-19 information overload among the general public. *Journal of Racial and Ethnic Health Disparities*, *9*(1), 184–192. https://doi.org/10.1007/s40615-020-00942-0

Moko, Victor-Ikoh, & Okardi. (2023). Information overload: A conceptual model. *European Journal of Computer Science and Information Technology*, *11*(5). 19-29.

Moldovan, L. (2016). Training outcome evaluation model. *Procedia Technology*, *22*, 1184–1190. https://doi.org/10.1016/j.protcy.2016.01.166

Nickols, F. W. (2005). Why a Stakeholder Approach to Evaluating Training. *Advances in Developing Human Resources*, *7*(1), 121–134. https://doi.org/10.1177/1523422304272175

Nikandrou, I., Brinia, V., & Bereri, E. (2009). Trainee perceptions of training transfer: an empirical analysis. *Journal of European Industrial Training*, *33*(3), 255–270. https://doi.org/10.1108/03090590910950604

Obmiński, Z. (2016). Intensified training periods: when much is to too much? *Journal of Combat Sports and Martial Arts*, *7*(2), 117–125. https://doi.org/10.5604/01.3001.0009.9077

Paepcke-Hjeltness, V., Mina, M., & Cyamani, A. (2017). Sketchnoting: A new approach to developing visual communication ability, improving critical thinking and creative confidence for engineering and design students. *2017 IEEE Frontiers in Education Conference (FIE)*. https://doi.org/10.1109/fie.2017.8190659

Paepcke-Hjeltnesss, V., & Lu, T. (2020). Sketchnoting: A visual literacy methodology. In *Crossing boundaries and disciplines: The book of selected readings 2019* (D. M. Baylen (Ed.), Vols. 61–80. International Visual Literacy Association.

Paivio, A., & Csapo, K. (1973). Picture superiority in free recall: Imagery or dual coding? *Cognitive Psychology*, *5*(2), 176–206. https://doi.org/10.1016/0010-0285(73)90032-7

Parker HR. (2022, October). *Blog: Training versus Learning & Development*. Retrieved November 4, 2023, from https://www.linkedin.com/pulse/training-versus-learning-development-parker-hr-solutions-2c/

Peters, G. J. Y. (2014). The alpha and the omega of scale reliability and validity: Why and how to abandon Cronbach's alpha and the route towards more comprehensive assessment of scale quality. European Health Psychologist, *16*(2), 56-69. doi:10.31234/osf.io/h47fv

Rathore, F., & Farooq, F. (2020). Information overload and infodemic in the COVID-19 pandemic. *Journal of the Pakistan Medical Association*, *0*, 1. https://doi.org/10.5455/jpma.38

Richardson, D. B., Hamra, G. B., MacLehose, R. F., Cole, S. R., & Chu, H. (2015). Hierarchical Regression for Analyses of Multiple Outcomes. *American Journal of Epidemiology*, *182*(5), 459–467. https://doi.org/10.1093/aje/kwv047

Rio, A. (2019, January). *Information overload: the plague of learning and development*. Chief Learning Officer - CLO Media. Retrieved October 30, 2023, from https://www.chieflearningofficer.com/2019/01/11/information-overload-the-plague-of-learning-and-development/

Roetzel, P. G. (2018). Information overload in the information age: A review of the literature from business administration, business psychology, and related disciplines with a bibliometric approach and framework development. *Business Research*, *12*(2), 479–522. https://doi.org/10.1007/s40685-018-0069-z

Rohde, M. (2012). Sketchnote handbook: The illustrated guide to visual note taking (1st ed.). Peachpit Press.

Roy, M. C., Roy, M. J., and Bouchard, L. (2017). Improving board knowledge with information and communication technologies. Electron. J. Knowl. Manag. 15, 215–224

Sahni, J. (2020). Managerial training effectiveness: An assessment through kirkpatrick framework. *TEM Journal*, 1227–1233. https://doi.org/10.18421/tem93-51

Salas, E., & Cannon-Bowers, J. A. (2001). The science of training: a decade of progress. *Annual Review of Psychology*, *52*(1), 471–499. https://doi.org/10.1146/annurev.psych.52.1.471

Sandholdt, C. T., Srivarathan, A., Kristiansen, M., Malling, G. M. H., Olesen, K. V. M., Jeppesen, M., & Lund, R. (2022). Undertaking graphic facilitation to enable participation in health promotion interventions in disadvantaged neighbourhoods in Denmark. *Health Promotion International*, *37*(2), 48–59. https://doi.org/10.1093/heapro/daac034

Satiman, L. H., Abu Mansor, N. N., & Zulkifli, N. (2015). Return on Investment (ROI) training evaluation in Malaysian SMEs: factors influencing the adoption process. *Development and Learning in Organizations: An International Journal*, *29*(2), 18–21. https://doi.org/10.1108/dlo-05-2014-0035

Schroder, H. M., Driver, M. J., & Streufert, S. (1967). *Human Information Processing*. Holt, Rinehart, & Winston.

Shaw, W. H. (2010). Information overload. *IEEE Engineering Management Review*, *38*(1), 2–2. https://doi.org/10.1109/emr.2009.2039956

Simon. (1971). Designing organizations for an information-rich world. *Martin Greenberger, Computers, Communication, and the Public Interest*, 40–41.

Singh, S. (2017). Trainee characteristics and transfer of training: Effect of supervisory support (A study of public managers in Nepal). *Journal of Business and Management Research*, *2*(1–2), 1–13. https://doi.org/10.3126/jbmr.v2i1-2.18148

Skulmowski, A., & Xu, K. M. (2021). Understanding cognitive load in digital and online learning: a new perspective on extraneous cognitive load. *Educational Psychology Review*, *34*(1), 171–196. https://doi.org/10.1007/s10648-021-09624-7

Smidt, A., Balandin, S., Sigafoos, J., & Reed, V. A. (2009). The Kirkpatrick model: A useful tool for evaluating training outcomes. *Journal of Intellectual & Developmental Disability*, *34*(3), 266–274. https://doi.org/10.1080/13668250903093125

Stull, A. T., & Mayer, R. E. (2007). Learning by doing versus learning by viewing: Three experimental comparisons of learner-generated versus author-provided graphic organizers. *Journal of Educational Psychology*, *99*(4), 808–820. https://doi.org/10.1037/0022-0663.99.4.808

Suraj, N., & N, A. (2023). Examining the effectiveness of virtual training under the Kirkpatrick model: A post-COVID study. *Macro Management & Public Policies*, *5*(4), 1–10. https://doi.org/10.30564/mmpp.v5i4.5361

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, *12*(2), 257–285. https://doi.org/10.1207/s15516709cog1202_4

Sweller, Merrienboer V., & Paas. (1998). Cognitive Architecture and Instructional Design. *Educational Psychology Review*, *10*, 251–296. https://doi.org/10.1023/A:1022193728205

Thalheimer, V. C. & Vector Solutions. (2018, February). *Evidence-based training methods and smile sheets (An interview with Dr. Will Thalheimer)*. Vector Solutions. Retrieved November 5, 2023, from https://www.vectorsolutions.com/resources/blogs/evidence-based-training-methods-and-smile-sheets-an-interview-with-dr-will-thalheimer/

Thalheimer, W. (2018, February). *Donald Kirkpatrick was NOT the originator of the four-level model of learning evaluation*. Work-Learning Research. https://www.worklearning.com/2018/01/30/donald-kirkpatrick-was-not-the-originator-of-the-four-level-model-of-learning-evaluation/

Thomas-Larmer, J. (2022, March). *'Graphics' clients rave despite potential flaws*. Mediate. Retrieved November 8, 2023, from https://mediate.com/graphics-clients-rave-despite-potential-flaws/

Thorell, L. B., Lindqvist, S., Bergman Nutley, S., Bohlin, G., & Klingberg, T. (2008). Training and transfer effects of executive functions in preschool children.

Developmental Science, *12*(1), 106–113. https://doi.org/10.1111/j.1467-7687.2008.00745.x

Toffler, A. (1970). *Future Shock* (1st ed.). Bantam Books.

Training magazine. (2022). 2022 Training industry report. In *Training Magazine*. Retrieved October 15, 2023, from https://trainingmag.com/2022-training-industry-report/

van Braak, M., Schaepkens, S. P. C., van Dolder, E., Dral, L. K., van der Horst, Z., Houben, D. B., & Mees, E. E. (2023). What affects you? A conversation analysis of exploring emotions during reflection sessions in Dutch general practitioner training. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1198208

van Merrienboer, J. J. G., Kirschner, P. A., & Kester, L. (2003). Taking the Load Off a Learner's Mind: Instructional Design for Complex Learning. *Educational Psychologist*, *38*(1), 5–13. https://doi.org/10.1207/s15326985ep3801_2

Vetter, T. R. (2017). Descriptive statistics: Reporting the answers to the 5 basic questions of who, what, why, when, where, and a sixth, so what? *Anesthesia & Analgesia*, *125*(5), 1797–1802. https://doi.org/10.1213/ane.0000000000002471

Wammes, J. D., Meade, M. E., & Fernandes, M. A. (2016). The drawing effect: Evidence for reliable and robust memory benefits in free recall. *Quarterly Journal of Experimental Psychology*, *69*(9), 1752–1776. https://doi.org/10.1080/17470218.2015.1094494

Woolsey, B. (2017, May 4). *Why so many companies get training wrong*. Retrieved October 18, 2023, from https://www.bbc.com/worklife/article/20201222-the-german-quereinsteiger-ending-career-changing-stigma

Yamamoto, S., Lauscher, A., Ponzetto, S. P., Glavaš, G., & Morishima, S. (2021). Visual summary identification from scientific publications via self-supervised learning. *Frontiers in Research Metrics and Analytics*, *6*. https://doi.org/10.3389/frma.2021.719004

Yu, C., Jiang, J., Zhong, M., Zhang, H., & Duan, X. (2023). Training load of newly recruited nurses in Grade-A Tertiary Hospitals in Shanghai, China: a qualitative study. *BMC Nursing*, *22*(1) 9-25. https://doi.org/10.1186/s12912-022-01138-z

Yurynets, O., & Khavura, M. (2021). The information overload of college students. *Collection of Scientific Papers of Uman State Pedagogical University*, *1*, 189–197. https://doi.org/10.31499/2307-4906.1.2021.228840

Zer, I., Bernales, A., & Valenzuela, M. (2023). Effects of information overload on financial markets: How much is too much? *International Finance Discussion Paper*, *1372*, 1–45. https://doi.org/10.17016/ifdp.2023.1372

Zhao, W., Liu, Z., Wang, T., Yin, X., Sun, Y., Zhang, X., & Yang, H. (2023). Assessment of a training project of English as a media of instruction (EMI) using Kirkpatrick model. *BMC Medical Education*, *23*(1) 271-278. https://doi.org/10.1186/s12909-023-04204-5

Zheng, R., Fernández Camporro, M., Romat, H., Henry Riche, N., Bach, B., Chevalier, F., Hinckley, K., & Marquardt, N. (2021). Sketchnote Components, Design Space Dimensions, and Strategies for Effective Visual Note Taking. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. https://doi.org/10.1145/3411764.3445508

APPENDIX A: QUESTIONNAIRE (ENGLISH VERSION)

Dear Participant,

My name is Nattapon Aunhabundit. I am a student from National Taiwan Normal University studying International Human Resource Development. I am undertaking a dissertation which is an independent research study. This research experiment aims to investigate the impact of graphic recording on training.

The findings of this study will provide valuable insights for trainers and educators on the potential benefits and best practices for incorporating graphic recording as a pedagogical tool. Additionally, the implications derived from the study can serve as a foundation for further research, encouraging the exploration of additional strategies and techniques that leverage visual elements to optimize training and teaching processes.

Your participation in this research experiment is entirely voluntary. Your privacy and confidentiality will be strictly maintained throughout the study. If you have any questions or concerns, feel free to contact: naunhabundit@gmail.com.

Thank you for considering participating in this research experiment. Your contribution will greatly contribute to the advancement of knowledge in this field.

Sincerely,

Graduate Student: Nattapon Aunhabundit

Advisor: Lu, Cheng-Chieh, PhD

Graduate Institute of International Human Resource Development

National Taiwan Normal University

Section One.

Please select the rightest answer.

[Assessing Kirkpatrick's Training Effectiveness Level 2: Learning]

K1. Which statement is "not" fundamental principles of systemic thinking?

☐ Thinking in the big picture.

☐ Able to communicate about complex problems.

☐ We are always a part of the system.

☒ Always creating a balanced perspective in the long run.

K2. Which is the "fundamental characteristic" of being a system?

☒ Systems can be adjusted to new purposes.

☐ It can exist with or without a purpose.

☐ Systems can only move forward; they cannot go back.

☐ Systems respond only to their own purposes.

K3. Which statement is the meaning of "emphasizing clear communication of vision and goals for collaborative work"?

☐ Seeing the interrelationships.

☐ Considering long-term impacts.

☐ Making supported decisions.

☒ Promoting effective communication.

K4. Which statement is "not" a sign of a pitfall in thinking?

☐ Work is done as much as possible.

☐ Rushing to fix things before they're done can lead to problems.

☐ If a problem is too big, it's better for the leader to make the decision.

☒ Even if we're just workers, doing poorly can still hurt the company.

K5. Which statement is "not" a component of system formation?

☐ Events (what we see or feel happening).

☐ Patterns (repeating events that allow prediction).

☒ Variables (things that can change events).

☐ Structures (the overall components of events).

K6. Which statement is "incorrect"?

☒ An action in a subsystem might not affect the larger system.

☐ Large systems always have other events happening.

☐ Systemic thinking allows for a broader view than linear thinking.

☐ Achieving one goal may lead to other events.

K7. What should be written in the head of the fishbone diagram?

☐ Key Factors.

☐ Events that follow.

☒ Topics/Goals.

☐ Nothing.

K8. Why is managing work with an A3 Report important?

☐ It's a Template.

☐ All the information is on one sheet for reading only.

☒ It's another tool for creating visualization and exchanging learning.

☐ There's no pre-made plan; it's designed by oneself.

K9. Which statement is "not" a record of applying systemic thinking to work?

☐ Helps in planning work.

☐ Helps in measuring success.

☐ Facilitates creative communication.

☒ Helps in making quick problem-solving decisions.

K10. Which statement is "not" a benefit of systemic thinking?

☐ Seeing past impacts.

☐ Not seeing the collaborative atmosphere in the team.

☒ Analyzing problems with intuition.

☐ Operating with careful consideration of long-term impacts.

Section Two.

Please choose the answer that you perceive towards the training.

(1 for strongly disagree; 5 for strongly agree)

[Assessing Kirkpatrick's Training Effectiveness Level 1: Reaction]

		Strongly Disagree (1)	Disagree (2)	Neither agree nor	Agree (4)	Strongly Agree (5)
R1	The trainer was an effective communicator with trainees					
R2	The trainer prepared the scientific material in an appropriate manner and in accordance with the objectives of the training programme.					
R3	The trainer prepared training activities appropriately and in accordance with the objectives of the training programme.					
R4	The trainer used appropriate training methods that were compatible with the course objectives.					
R5	The trainer achieved the goals of the programme.					
R6	The trainer gave trainees an opportunity to discuss and ask questions.					
R7	The trainer was able to use available training equipment.					

Section Three.

Please choose the answer that best suits your current situation.

(1 for strongly disagree; 4 for strongly agree)

[Assessing Information Overload]

		Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
IO1	There are so many different recommendations about **what to do**, it's hard to know which ones to follow.				
IO2	It has gotten to the point where I don't even care to hear new information about cancer.				
IO3	Information about **the training** all starts to sound the same after a while.				
IO4	I forget most **training** information right after I hear it.				
IO5	I feel overloaded by the amount of **training** information I am supposed to know.				

Section Four.

Gender ☐ Male ☐ Female

Age _____ years old.

Have you ever received training on this topic?

☐ Never ☐ Yes, but over 6 months

APPENDIX B: QUESTIONNAIRE (THAI VERSION)

ถึง ผู้เข้าร่วมการทดสอบ

โครงการวิจัยนี้มีเป้าหมายเพื่อศึกษาว่า Graphic Recording ส่งผลต่อการเรียนรู้ในผู้เรียนระหว่างเทรนนิ่งหรือไม่ ซึ่งผลการศึกษานี้จะให้ข้อมูลและความเข้าใจต่อผู้เรียน ผู้ฝึกอบรม และผู้ศึกษาเกี่ยวกับประโยชน์ที่อาจได้จาก Graphic Recording ในฐานะเครื่องมือการสอน นอกจากนี้ ผลที่ได้จากการศึกษานี้สามารถใช้เป็นพื้นฐานสำหรับการศึกษาต่อไปเพื่อเพิ่มประสิทธิภาพในกระบวนการสอนและการเรียนรู้

การเข้าร่วมโครงการวิจัยนี้เป็นเรื่องของความสมัครใจจากท่านเอง ข้อมูลส่วนตัวและคำตอบของท่านจะได้รับการรักษาอย่างเคร่งครัดตลอดการศึกษานี้ หากท่านมีคำถามหรือข้อกังวลใดๆ โปรดติดต่อ: naunhabundit@gmail.com

การมีส่วนร่วมของท่านจะเป็นส่วนสำคัญที่จะสร้างความก้าวหน้าในการเสริมสร้างความรู้ในสาขานี้ ทางผู้วิจัยขอขอบคุณที่พิจารณาเข้าร่วมโครงการวิจัย

ขอแสดงความนับถือ

ผู้เขียนงานวิจัย: ณัฐพร อุณหบัณฑิต

อาจารย์ที่ปรึกษา: Lu, Cheng-Chieh, PhD

Graduate Institute of International Human Resource Development

National Taiwan Normal University

ส่วนที่ 1

เลือกคำตอบที่ถูกต้องที่สุด

K1 ข้อใด “ไม่ใช่” หลักของการคิดเชิงระบบ

☐ การคิดที่ภาพใหญ่ (BigPicture) มากกว่า

☐ สามารถสื่อสารเกี่ยวกับปัญหาที่ซับซ้อนได้

☐ เราเป็นส่วนหนึ่งของระบบเสมอ

☒ สร้างสมดุลมุมมองเฉพาะในระยะยาว

K2 "ลักษณะพื้นฐาน" ของการเป็นระบบ คือข้อใด

☒ ระบบสามารถถูกปรับเปลี่ยนตามจุดประสงค์ใหม่

☐ ระบบจะมีหรือไม่มีจุดประสงค์ก็ได้

☐ ระบบต้องเดินหน้าอย่างเดียว ไม่สามารถย้อนกลับได้

☐ ระบบตอบสนองต่อจุดประสงค์ตัวเองเท่านั้น

K3 ข้อใดคือความหมายของ "เน้นการสื่อสารวิสัยทัศน์และเป้าหมายโดยมีความชัดเจน เพื่อการทำงานร่วมกัน"

☐ การเห็นความสัมพันธ์ซึ่งกันและกัน

☐ การพิจารณาผลกระทบระยะยาว

☐ การตัดสินใจโดยมีข้อมูลสนับสนุน

☒ การส่งเสริมการสื่อสารที่มีประสิทธิภาพ

K4 ข้อใด "ไม่ใช่" สัญญาณของหลุมพรางทางความคิด

☐ การทำงาน เสร็จเท่าที่ทำได้ก็พอ

☐ ต้องรีบแก้ไขให้เสร็จ จะเกิดอะไรขึ้นก็ปล่อยไปก่อน

☐ ปัญหานี้ใหญ่เกินไป ให้หัวหน้าตัดสินดีกว่า

☒ แม้เราจะเป็นแค่คนงานแต่ทำไม่ดีก็ทำให้บริษัทแย่อยู่ดี

K5 ข้อใด "ไม่ใช่" องค์ประกอบของการเกิดระบบ

☐ เหตุการณ์ (สิ่งที่เกิดขึ้นที่เรามองเห็นหรือรู้สึกได้)

☐ รูปแบบ (เหตุการณ์ที่เกิดขึ้นซ้ำๆ จนทำให้ทำนายได้)

☒ ตัวแปร (สิ่งที่ทำให้เหตุการณ์นั้นเปลี่ยนไปได้)

☐ โครงสร้าง (องค์ประกอบโดยรวมของเหตุการณ์ที่เกิดขึ้น)

K6 ข้อใด "ผิด"

☒ การกระทำสิ่งใดสิ่งหนึ่งในระบบย่อย อาจไม่กระทบระบบใหญ่เสมอไป

☐ การบรรลุเป้าหมายหนึ่ง อาจเกิดเหตุการณ์อื่นๆ ขึ้นมา

☐ การคิดเชิงระบบทำให้เห็นภาพกว้างกว่าการคิดเป็นเส้นตรง

☐ การบรรลุเป้าหมายหนึ่ง อาจเกิดเหตุการณ์อื่นขึ้นมา

K7 แผนผังก้างปลาส่วนหัว ควรเขียนเรื่องอะไร

☐ ปัจจัยที่สำคัญ

☐ เหตุการณ์ที่เกิดขึ้นตามมา

☒ หัวข้อ/เป้าหมาย

☐ ไม่ต้องใส่

K8 การบริหารงานด้วย A3 Report มีความสำคัญอย่างไร

☐ เป็น Template

☐ เป็นข้อมูลทั้งหมดที่อยู่ในกระดาษแผ่นเดียว เพื่อเอาไว้ใช้อ่านอย่างเดียว

☒ เป็นอีกเครื่องมือในการสร้างการเห็นภาพ + แลกเปลี่ยนเรียนรู้

☐ ไม่มีสูตรแบบแผน เพื่อให้ออกแบบเอง

K9 ทะเบียนข้อใด "ไม่ใช่" การประยุกต์ใช้ความคิดเชิงระบบกับการทำงาน

☐ ช่วยวางแผนการปฏิบัติงาน

☐ ช่วยวัดผลและประเมินความสำเร็จ

☐ ช่วยสื่อสารให้มีความสร้างสรรค์

☒ ช่วยตัดสินใจแก้ปัญหาแบบฉับพลัน

K10 ข้อใด "ไม่ใช่" ประโยชน์ของการคิดเชิงระบบ

☐ มองเห็นผลผลกระทบที่เคยมองไม่เห็น

☐ เกิดบรรยากาศการมีส่วนร่วมในทีม

☒ วิเคราะห์แยกแยะปัญหาได้ด้วยความรู้สึก

☐ ดำเนินการด้วยความรอบคอบถึงผลกระทบระยะยาว

ส่วนที่ 2

กรุณาเลือกคำตอบที่ตรงกับการอบรมนี้มากที่สุด

(1 = ไม่เห็นด้วยอย่างยิ่ง; 5 = เห็นด้วยอย่างยิ่ง)

		ไม่เห็นด้วยอย่างยิ่ง (1)	ไม่เห็นด้วย (2)	ไม่แน่ใจ (3)	เห็นด้วย (4)	เห็นด้วยอย่างยิ่ง (5)
R1	มีสื่อสารกับผู้เข้ารับการฝึกอบรมได้อย่างมีประสิทธิภาพ					
R2	การเตรียม "เนื้อหา" ที่เหมาะสม เพื่อตอบจุดประสงค์การอบรม					
R3	มีการเตรียมการ "กิจกรรม" อย่างเหมาะสม เพื่อตอบจุดประสงค์การอบรม					
R4	การใช้ "วิธีการอบรม" อย่างเหมาะสม เพื่อตอบจุดประสงค์การอบรม					
R5	การอบรมสามารถบรรลุเป้าหมายผู้เรียนได้					
R6	วิทยากรเปิดโอกาสให้ผู้เรียนได้ถามได้					
R7	สื่อ/เครื่องมือการอบรมมีประสิทธิภาพ					

ส่วนที่ 3

กรุณาเลือกคำตอบที่เหมาะสมที่สุดกับสถานการณ์ปัจจุบันของคุณ

(1 = ไม่เห็นด้วยอย่างยิ่ง; 4 = เห็นด้วยอย่างยิ่ง)

		ไม่เห็นด้วยอย่างยิ่ง (1)	ไม่เห็นด้วย (2)	เห็นด้วย (3)	เห็นด้วยอย่างยิ่ง (4)
IO1	มีสิ่งที่ต้องเรียนมากมายเกี่ยวกับวิธีการที่ควรทำ จึงยากที่จะรู้ว่าต้องทำตามข้อไหนบ้าง				
IO2	ฉันอยู่ในจุดที่ ไม่อยากฟังเรื่อง System Thinking อีกแล้ว				
IO3	เมื่อฟังการอบรมไปสักพัก ฉันรู้สึกเหมือนเรื่องที่พูดนั้นคล้ายกัน				
IO4	ฉันลืมเนื้อหาส่วนใหญ่ที่สอนในวันนี้				
IO5	ฉันรู้สึกว่าเนื้อหาการอบรมเยอะมากกว่าที่ฉันควรจะรู้				

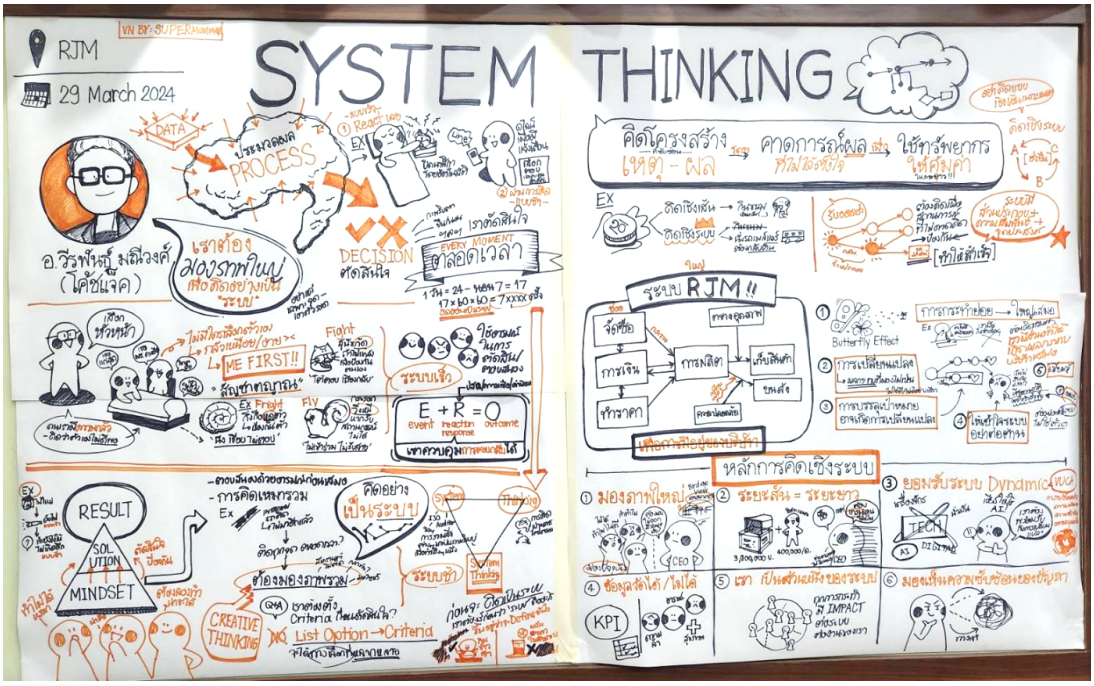
ส่วนที่ 4

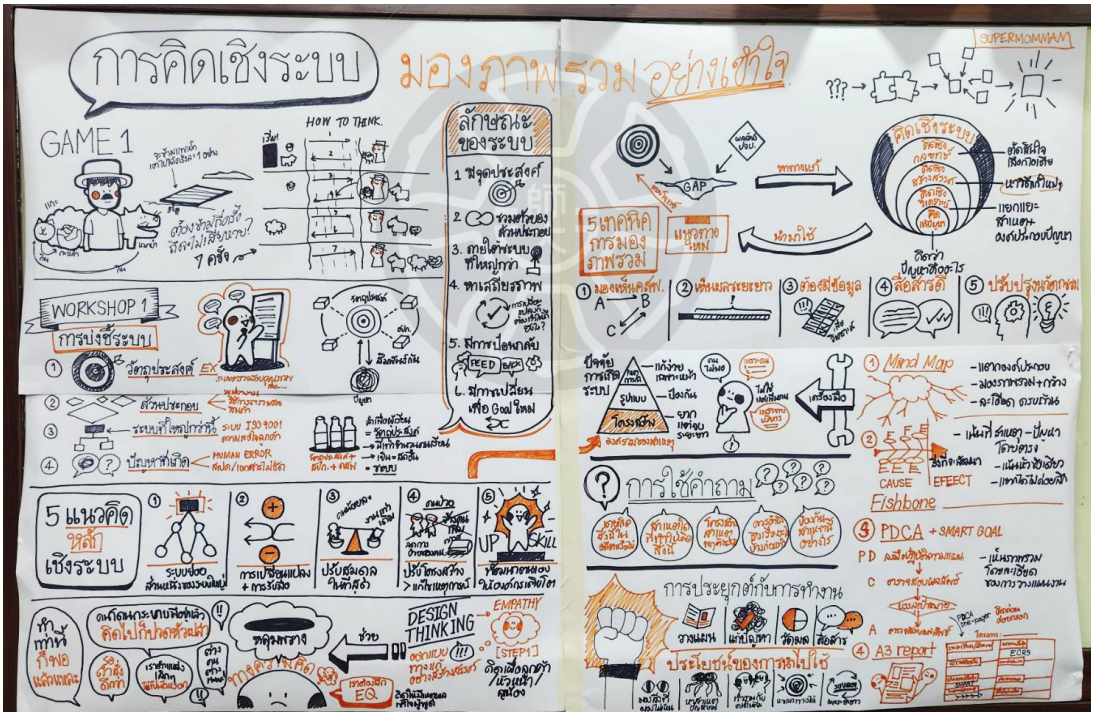
เพศ ☐ ชาย ☐ หญิง

อายุ _____ ปี

คุณเคยเข้าร่วมอบรมนี้หรือไม่ ☐ ไม่เคย ☐ เคย มากกว่า 6 เดือนก่อน

APPENDIX C: EXPERIMENT SETTING





The training focuses on system thinking, which strikes a balance between being neither too specific nor too general to comprehend. Feedback from trainees consistently confirms that the graphic recordings assist them in grasping the big picture and recalling the events of the day. Moreover, the trainer also finds it impressive how the information is promptly captured, making it beneficial for documentation purposes.