Comparing Pecha Kucha and Traditional Training Methods in Occupational Safety Training

by

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Recently, speculation has begun developing amongst researchers in terms of the effectiveness of training program presentations as well as their ability to educate learners. This is due to a number of reasons given from learners based on their thoughts of current methods of teaching concepts. To bring more meaningful information into education lectures and safety training, researchers and educators have explored a variety of concepts to enhance the learning experience in various environments. These concepts are pulled from topics such as adult learning theories, multimedia teaching, increased presentation rates, and learner interaction.

A more fast-paced Japanese method of presenting, known as Pecha Kucha, is gaining the attention of researchers and educators. It is seen as a quicker, more interesting way of teaching the material within a short period of time all while constantly keeping the attention of the listener. Pecha Kucha may have the upper hand over traditional PowerPoint presentations in terms of learning because there are less images and text on slides, and it reduces cognitive load. The two presentation styles may be just as effective when compared to each other in terms of retention as both would possibly make important material easier to identify versus a regular lecture that did not use multimedia to assist with teaching.

The objective of this research is to examine if Pecha Kucha presentations are more beneficial for learners when compared to PowerPoint presentations. Very few studies were

found in regards to Pecha Kucha, but out of those that were found, a majority of them focused on what the presenter was able to take away from the presentation rather than the learner. This study assesses if Pecha Kucha presentations will provide a difference in audiences' ability to learn and retain concepts versus a traditional didactic method of presenting with PowerPoint. Secondly, it also analyzes if the audience expressed more interest in Pecha Kucha presentations than the method of presenting regularly with PowerPoint. The findings from this study will contribute to and improve previous studies of adult learning methods as they relate to the use of Pecha Kucha presentations and the effects it has within the learning environment, whether it be the classroom or occupational safety training.

Comparing Pecha Kucha and Traditional Training Methods in Occupational Safety Training

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DEDICATION

I would like to dedicate this thesis to two very special people who are no longer here physically, but live on through all of the morals and values I display: a man who raised me and taught me most of everything I know, my late father, Mr. Eric Toomer. Also, a very sweet woman who would give you the shirt off of her back if you needed it, my late Aunt Phyllis Campbell. They have been the biggest influences for me to always test my limits and aiming for the best. I can only hope that all I have done thus far has made them proud.

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CHAPTER 1

Introduction

Recently, speculation has begun developing amongst researchers in terms of the effectiveness of training program presentations as well as their ability to educate learners. This is due to a number of reasons given from learners based on their thoughts of current methods of teaching concepts. Previous studies have looked into this issue and addressed the ongoing concerns of effectively educating learners on concepts important to the work they would perform. The main concern is that these programs are not effective due to the lack of interest learners have in the presentation of the materials. Based on feedback obtained in previous studies from participants, training was seen as an inconvenience due to its lack of appeal and relevancy (Galbraith & Fouch, 2007; Nakayama & Jin, 2015; Zierold, Welsh, and McGeeney, 2012; Pisaniello et al., 2013). In order to fix this problem, researchers have focused on the feedback from these previous studies where learners are voicing their concerns and suggestions on improving traditional teaching methods. This feedback in most cases is that the normal ways of training and educating learners are "boring" and "inconvenient," as these methods tend to have insufficiencies in meaningful information (Galbraith & Fouch, 2007; Nakayama & Jin, 2015; Zierold, Welsh, and McGeeney, 2012; Pisaniello et al., 2013). Insufficiencies in meaningful information based on the learners' perspective is that there is not enough information within training sessions that is important and relevant to the tasks they perform on the job, therefore the information may not mean as much (Galbraith & Fouch, 2007; Zierold, Welsh, and McGeeney, 2012). By correcting these inefficiencies, better learning and working experiences would occur, and better outcomes, whether they be within the workplace or classroom, would be attainable in the long run (Dermirkesen & Arditi, 2015; Galbraith & Fouch, 2007).

To bring more meaningful information into education lectures and safety training, researchers and educators have explored a variety of concepts to enhance the learning experience in various environments. These concepts are pulled from topics such as adult learning theories, multimedia teaching, increased presentation rates, and learner interaction. Adult learning theory and practice became increasingly well known in the US during the 20th century due to its coverage of various dimensions of learning, memory, and environmental and cultural factors (Nakayama & Jin, 2015; Schmidt et al., 2009). When looking into additional studies on improving teaching methods, all would reference back to the ideologies that adult learning theories employ as they seek to fill the interest and convenience void stated by learners. Increased presentation rates are associated with shortening the length of time in which it takes to present information on a topic, given the amount of information needed to cover. Researchers found that one of the major factors affecting memory performance is the amount of time available for study during the teaching of important concepts, which is likely due to teaching multiple concepts during lectures (Bayraktar & Altun, 2012; Jonge et al., 2012; OSHA, 2015). Multimedia learning is a method used to create more learner engagement and interaction during lectures. By increasing interaction, it was found that learners are able to retain information better as they become more involved with the lecture material (Klein, n.d.; Mckinney, Dyck, & Luber, 2009). Methods that are being used include, teaching through podcasts, integrating personal stories into lectures, and using popular actions and people in critical messages in learning material.

In contrast to the traditional methods of teaching, a more fast-paced Japanese method of presenting, known as Pecha Kucha, is gaining the attention of researchers and educators. It is seen as a quicker, more interesting way of teaching the material within a short period of time all

while constantly keeping the attention of the listener. Pecha Kucha is a presentation using 20 slides each programmed to 20-seconds each; the slides contain only pictures, photos, or graphics (i.e., pictorial, limited or no text) and the entire presentation lasts for a total duration of 6 minutes and 40 seconds (Gaze, Beyer, and Lazicki, 2012; Glendall, 2007; http://www.pechakucha.org). The automatization and fast pace of the slides forces the presenter to be organized in order to capture each slide's message, while "the selection of imagery used can support key points" in learning material (Gaze, Beyer, and Lazicki, 2012). Gaze, Beyer, and Lazicki also determined that Pecha Kucha may have the upper hand over traditional PowerPoint presentations in terms of learning as it reduces cognitive load because there are less images and text on slides. The two presentation styles may be just as effective when compared to each other in terms of retention as both would possibly make important material easier to identify versus a regular lecture that did not use multimedia to assist with teaching (Gaze, Beyer, and Lazicki, 2012). There is limited research examining the use and learning impact of Pecha Kucha in learning environments such as classrooms and occupational safety training, especially comparing its effects to those of traditional lecturing methods. This creates a need for additional research in order to further examine the effects of Pecha Kucha when compared to other methods of educating, that would not only help to fill a void in research that could be compared to other studies, but to also assist with further developments in ways to educate adult learners based on their interests.

Need for Research

Very few studies were found in regards to Pecha Kucha, but out of those that were found, a majority of them focused on what the presenter was able to take away from the presentation rather than the learner. The studies observing the learners focused on the retention ability of learners when compared to other methods of teaching, but did not focus on what the learner

thought of the presentation style. With this in mind, more research is needed that would investigate whether the learner has the ability to benefit from Pecha Kucha, in terms of learning ability and retention, as well as examining the interest of the presentation method.

Research Questions and Hypothesis

The present study raises the following research questions that are based on the methods used as well as research needs:

1. Will the Pecha Kucha presentation produce increased post exam scores when compared to the regular Traditional presentation?

   Alternate Hypothesis: The Pecha Kucha presentation will produce increased post exam scores when compared to those of the regular Traditional presentation.

   Null Hypothesis: The Pecha Kucha presentation will produce equal or inferior post exam results when compared to those of regular Traditional presentations.

2. Will the Pecha Kucha presentation produce increased retention exam scores when compared to the regular Traditional presentation following the retention exam given two weeks after each presentation?

   Alternate Hypothesis: The Pecha Kucha presentation will produce increased retention exams scores when compared to those of regular Traditional presentations.

   Null Hypothesis: The Pecha Kucha presentation will produce equal or inferior retention exams scores when compared to those of regular Traditional presentations.

3. Will the Pecha Kucha presentation be more interesting (considering time until first distraction, number of distractions per minute, and most common type of distraction) to the audience than the Traditional presentation?

   Alternate Hypothesis: The students will express more interest in the Pecha Kucha presentation when compared to interest expressed in the Traditional Presentation.

   Null Hypothesis: The students' interest expressions will be equal or inferior with the Pecha Kucha presentation when compared to interest expressed in the Traditional Presentation.

4. Will the students exhibit higher time values before their first distraction for the PK training when compared to the Traditional training?

   Alternative Hypothesis: The students will exhibit a higher time difference between the beginning of the presentation and their first distraction in the PK training when compared to the Traditional training.

   Null Hypothesis: The students will exhibit a similar or lower time difference between the beginning of the presentation and their first distraction in the PK training when compared to the Traditional training.

5. Will the students exhibit lower values in distractions per minute for the PK training when compared to the Traditional training?

   Alternative Hypothesis: The students will exhibit lower values in distractions per minute in the PK training when compared to the Traditional training.

Null Hypothesis: The students will exhibit similar or higher values in distractions per minute in the PK training when compared to the Traditional training.

6. Will there be a difference in the most common form of distraction between the PK and Traditional training group based on the variables observed?

   Alternative Hypothesis: There will be a difference in the most common form of distraction between the PK and Traditional training group based on the variables observed.

   Null Hypothesis: There will be a similarity in the most common form of distraction between the PK and Traditional training group based on the variables observed.

Research Objectives

The objective of this research is to examine if Pecha Kucha presentations are more beneficial for learners when compared to PowerPoint presentations in terms of retention of information and interest.

Statement of Purpose

To achieve the research objective, this study assessed if Pecha Kucha presentations provided a difference in audiences' ability to learn and retain concepts versus a traditional didactic method of presenting with PowerPoint. Secondly, it also analyzed if the audience expressed more interest in Pecha Kucha presentations than the method of presenting regularly with PowerPoint.

Significance of the Study

The significance of the present study is that it contributes to and improve previous studies of adult learning methods as they relate to the use of Pecha Kucha presentations and the effects it has within the learning environment, whether it be the classroom or occupational safety training. The lack of research done regarding this topic indicates the need for more supportive research with Pecha Kucha. Completion of this type of study with the use of adult learning theories has not been done before, thus it adds to the body of knowledge in occupational safety and health training (OSH), and could also be generalized for interdisciplinary studies beyond OSH depending on the results.

Assumptions

The following assumptions were made for this research: (1) the students did not exhibit false recall when tested for learning and retention abilities, (2) the students' answer during the focus group discussions were not biased in any way, and (3) when the students are writing during the presentation, they were taking notes and were not distracted.

Terminology

The terminology used to locate previous relevant studies in literature include:

Adult learning theory, andragogy, didactic lecturing, Pecha Kucha effectiveness, presentation rates, retention, and training program effectiveness

Abbreviations

The following terms have mentioned abbreviations within portions of the document:

Pecha Kucha = PK

Occupational safety and health = OSH

Occupational Safety and Health Administration = OSHA

CHAPTER 2

Literature Review

Current State of Safety Training

Improving occupational safety training requires experimentation to determine the best methods based, not only on the needs of industries, but also the workers. Though employees are trained based on a variety of organization regulations and standards, most of the training is based on those of the Occupational Safety and Health Administration, with a majority of the material being "boring and meaningless" to learners (Demirkesen & Arditi, 2015; Wilkins, 2011; Pisaniello et al., 2013; Zierold, Welsh, & McGeeney, 2012). Individuals, both young and old, who have participated in safety training describe it negatively; this suggests a need for improvement in training methods. In a study that looks into teens' perceptions on safety training, many of the individuals reported being given instructions on how to do their job, as opposed to how to keep them safe (Zierold, Welsh, & McGeeney, 2012). This may cause confusion between safety and job training, as many students may not understand the meaning and intention of safety training. Other responses show that teens thought safety training was "just common sense," in addition to being "non-interactive and uninteresting," though they thought it was important (Zierold, Welsh, & McGeeney, 2012). The findings from this study suggest that safety training should be customized to cater to the needs of various learning styles. A reference from Kim et al. would agree with this suggestion, stating that educational methods should vary with workers' characteristics (Kim, Yu, Kim, & Kim, 2011; Dias, 2003). Variance should be considered due to the concept that not every worker has the ability to learn content similarly from non-varied educational methods (Kim, Yu, Kim, & Kim, 2011). To improve methods, researchers must examine areas within the current methods being used by companies

and determine what further developments can be made, in regards to workers' interests. To assist with the educating and training of employees, OSHA provides information for employers that are designed to lead to fewer injuries and illnesses, better morale, lower insurance premiums, in addition to others. Some of these educational materials include brochure, fact sheets, guidance documents, online safety and health topics pages, and posters, just to name a few, and can be found online at OSHA's website (OSHA, 2015). OSHA also provides training through its Training Institute Education Centers which offer courses on a variety of safety and health topics, in addition to encouraging worker participation in improving and developing training programs (OSHA, 2015). These methods have been improved by OSHA over time, but prior studies, mentioned previously, state that employees have been providing feedback that still suggests more improvements can be made (Galbraith & Fouch, 2007; Nakayama & Jin, 2015; Zierold, Welsh, and McGeeney, 2012; Pisaniello et al., 2013).

Examining the current aspects of occupational safety training, previous research suggests that employees are less prone to workplace accidents when the trainee is more involved and engaged in the learning environment (Brahm & Singer, 2013; Wilkins, 2011). Both physical and emotional interaction are important elements in improving learning within the occupational safety and health field. Brahm and Singer (2013) have determined that enhanced training that involves higher engagement could lead to improvements in occupational safety and health. With this type of training, learners are actively taking part in their learning experience which includes "feedback-based training with specific content, and behavioral modeling and hands-on based training" (Brahm & Singer, 2013). This goes along with the ideology of accelerated learning, where Tapp (2007) states that any tool that increases and enhances learning is taken into consideration. The principles behind accelerated learning, as it relates to safety training include:

- involving all parts of the learner (such as the mind and body);
- entrusting trainees to create knowledge-and not just store it;
- enhancing learning through teamwork;
- and using activities rather than presentations (Tapp, 2007).

These principles, which encourage the use of games and activities, are designed to increase the level of engagement in learning environment, leading to improvements in training methods and fewer workplace accidents (Tapp, 2007). Implementing increased engagement in safety training may also signify that employers may have the best intentions when orchestrating the procedures. This is due to the concept that employers consider "effective safety training" as a strategy for better outcomes in safety related situation (Wilkins, 2011). Some researchers have even explored the idea of virtualizing safety training to determine its effectiveness versus hands-on training. Due to wavering circumstances such as advancements in technology and national economic changes, organizations have shifted away from face-to-face, hands-on training to online training (Nakayama and Jin, 2015). It was found that online training is challenged in terms of recreating the “hands-on” element that is important to adult learning, leading to the possibility of being less effective (Nakayama and Jin, 2015). If participants are given a sufficient amount of information within the virtual environment, it has been shown that these individuals who complete their training virtually are able to retain just as much information as their peers who received hands-on training in a mechanical lab environment (Nakayama and Jin, 2015). Thus educators are being urged to develop more engaging learning sessions by having adult learners involved in discussions, problem solving, and hands-on activities, versus just lecturing alone on training materials. With this brand of training, limitations could possibly be

encountered depending on the participants' physical and mental abilities, in which the participants could face dilemmas with complicated language and learning disabilities that could keep them from effectively learning the material (Wilkins, 2011).

Improving workplace training programs

As mentioned, the learner's interest in the presentation material is also a key indicator in terms of how effective the training program may be. A critical factor of interest in materials is attention spans during the presentations (Bayraktar & Altun, 2012). Bayraktar and Altun (2012) observed this factor where the recall performances of learners with different short term memory spans was investigated by measuring the effect of a multimedia learning environment designed with two different attention types (focused – split). The findings indicate that multimedia instructional designs were effective on recall performances, where higher performances were seen in the focused design (Bayraktar & Altun, 2012). No significant difference was seen when short-term memory spans were taken into account. Higher performances in long term memory from multimedia instructional designs is likely due to the notion that individuals are more likely to remember pictures and videos rather than words (Bayraktar & Altun, 2012). In another study, the method of storytelling is used in an effort to capture maintain the attention of learners to increase the effectiveness of safety training. The objective of the project was to determine whether researchers could develop effective training materials for the mining industry. The videos used stories told within the industry to convey specific safety awareness messages and did so in a way that was interesting and accepted by the occupational culture of the trainees (Cullen, 2008). Researchers found that most of the teaching-stories they gathered could be divided into four broad groups, categorized by the type of story or the role of the main characters (Hero, Villain, Adventure or disaster, and Fool) (Cullen, 2008). The categories are the author's attempt

to find meaning in the many stories that were shared, by defining common themes. All of these stories are useful for creating effective training, as long as one listens carefully for the underlying messages. Evaluation of this study has shown that the stories within the videos are effective, and should also be measured in future studies based on acceptance in other industries (Cullen, 2008). The key for a safety trainer, then, is to find the internal control switch in each trainee that responds to the "why should I care about this information?" question. This will be kept in mind as this study will use multimedia presentation methods in its delivery as well.

To determine the needs in improving training effectiveness, we must look into what is currently known about its effectiveness and discern out where the gaps in understanding are to better assess methods of improvement (Miller, McNear, & Metz, 2013; Nakayama & Jin, 2015). In a study conducted by Miller, McNear, and Metz (2013) that reviewed training program interventions, researchers sought to answer the question on whether higher engagement Occupational Health and Safety training has a greater beneficial effect on workers and firms than lower engagement in Occupational Health and Safety training. This was done by measuring the effects training programs had on knowledge, attitudes, beliefs, and health. Based on the findings in comparing the training interventions administered with the experimental methods (high, medium, or low engagement training) versus the control methods (received no training), positive, strong results were seen in the effects on knowledge, and mixed positive and negative results in effects on attitudes and beliefs as well as effects on behaviors, and effects on health (Miller, McNear, & Metz, 2013). Though there were results from this study to support higher engaging methods being more beneficial, there was not enough evidence to show if high engagement training is more effective the medium/low level engagement training on knowledge, attitudes, beliefs, or health as well as behaviors. This lack of evidence from prior studies suggests that

future research should be more rigorous, which will assist in developing a lead on the question of whether high engagement training is more effective.

Utilizing concepts to encourage active learning through engaging lectures has also been investigated to determine if it would be more effective in comparison to traditional lecturing methods. Active learning is a student-centered teaching technique that uses various interactive, multimodal strategies to create a more engaging classroom setting compared with the traditional didactic lecture (Nakayama & Jin, 2015). The purpose of using active learning is to keep students engaged in the material to provide an environment that increases student performance while also motivating the students to learn, increasing classroom satisfaction, and facilitating higher-level thinking skills. In comparison, the traditional didactic lecture creates an instructor-centered classroom setting in which students are more passive listeners than active learners (Miller, McNear, & Metz, 2013; Nakayama & Jin, 2015). One study evaluated the impact of engaging lectures on student performance in a large, professional-level dental physiology course, and compared these impacts versus those of traditional lecture methods. The findings of the study indicated that the use of engaging lectures led to a statistically significant improvement in student performance on unit exams (Nakayama & Jin, 2015). Students also demonstrated an improved long-term retention of information via increased scores on the comprehensive final exam. These results should encourage the experimentation of engaging lectures within other industries and learning environments to determine how effective the methods would be in improving learning and retention (Nakayama & Jin, 2015).

Another way that industries are attempting to increase learning through retaining attention is by using popular figures and actions in education materials. In a study on airline pre-flight safety, one safety measure airlines address is the attention given to the pre-flight safety

briefing. Some airlines have begun using creative marketing techniques to resolve issues with poor attention from passengers to the pre-flight safety video (Seneviratne & Molesworth, 2015). This is done to address feedback from passengers that the briefing in most cases is considered "repetitious and boring" (Seneviratne & Molesworth, 2015). This study investigated the effectiveness of such methods in gaining and maintaining the attention of passengers. A sample of 45 participants were split into 3 groups (standard, humorous, and celebrity safety video) and watched the associated pre-flight video according to their groups. Though humor has been shown to positively affect attention, primarily because the humorous message is perceived as more interesting, if used at the wrong time, it can disrupt the processing of the target message (Seneviratne & Molesworth, 2015). The use of celebrities in advertising is supported by the public's fascination and obsession with famous individuals. The increased attention to sport personalities and movie stars by the public is likely due to the attractiveness and credibility of these celebrities (Seneviratne & Molesworth, 2015). For this study, eye gaze as well as key safety messages recalled were analyzed and compared between groups. The results of this experiment have shown that the humorous safety pre-flight video was the most effective in term of keeping attention and remembering key messages among the participants (Seneviratne & Molesworth, 2015).

Incorporation of more engaging methods of safety training should seek to address a variety of individuals within different age groups. Thus, the difference in learning and memorization abilities between younger (ages 30 and under) and older (ages 50 and over) adults should be kept in mind when improving methods so that training will be beneficial for all age groups, regardless of abilities. Similar to this study, one previous study examined verbal learning and memory in the young and old participants using the California Verbal Learning Test

(CVLT). Their findings suggest that at the faster presentation rate, the younger individuals perform significantly better than the old on recall, but at the slower presentation rate, the differences between age groups diminished (Weible et al., 2002). This means that by giving the elderly more time to rehearse information, age-related differences in memory recall could be greatly diminished (Weible et al., 2002). This could possibly be a positive or negative attribute for older adults, depending of the pace of the work environment they're in, and within the fast paced occupational safety profession, it may be more of a negative.

Presentation Rates and Learning

When examining the delivery of training material, a few factors are critical in terms of the role they play in the trainee's learning. One of the factors that has received attention is the presentation rates of the material being taught. Presentation rate is associated with the length of time it takes to present information on a topic, given the amount of information, as well as additional interaction between the presenter and the audience, if any (Smith & Kimball, 2012; Weible et al., 2002). With the main aspect of this research focusing on presentation rates, previous research studies have observed the effects it has on learning abilities of learners. Researchers recall that one of the major factors affecting memory performance is the amount of time available for study during the teaching of important concepts (Schmidt et al., 2009). When delivering the presentations, some of the delivery methods went as far as executing a variety of presentation rates to determine which would be the most effective for learning, as well as retention of information (Schmidt et al., 2009; Smith & Kimball, 2012; Weible et al., 2002). Retention was tested by observing the test subjects' memory of the presented information either immediately or a certain period of time afterwards. The results of these studies were mostly mixed as some of the findings displayed either low learning and recall performance or no

difference between the two rates (Schmidt et al., 2009; Smith & Kimball, 2012; Weible et al., 2002). This shows that certain presentation rates could either reduce learning performance or have no impact on the learning or retention of individuals.

When examining retention, it is also important to keep in mind false recall of information from individuals in the study. Smith and Kimball (2012) explain that false recall, in relation to their study, is falsely exhibiting memories of information from presentations that were given to audience members. In a series of experiments, they investigated three problems with false recall, which were immediate versus delayed recall, temporal resolution, and cognitive organization (Smith & Kimball, 2012). Their findings indicated that the results for veridical recall replicated previous results in the literature with the average recall of studied words increasing monotonically as stimulus onset asynchronies (SOA) increased. SOA is a psychological tactic that measures the time between the end of one stimulus to the beginning of the next, where in this case, the stimuli are words (Smith & Kimball, 2012; Yu & Choe, 2006). False recall did not rise in parallel with veridical (truthful) recall. Instead false recall levels were quite high even for the fastest presentation rates (Smith & Kimball, 2012). This means that individuals are more likely to develop false memories of the material presented to them when given at a faster rate than slower paced presentation. This is critical as the need to avoid false recall during this study is very important.

How Does Pecha Kucha relate to adult learning theories?

When determining the ability of different styles of presentations to create a difference in the learning of individuals, it is important to keep important learning concepts, such as adult learning theory, in mind. The objective of adult learning theory is to place consideration on critical methods in which adults are able to learn best (Galbraith & Fouch, 2007). Using these

concepts in lectures and presentations are key, as they are the most common ways that learners are taught. Previous studies have shown that even though lectures are one of the most common methods of knowledge transfer, there are still questions that linger in regards to their effectiveness. According to Galbraith and Fouch (2007), these concerns include "passive formats, lack of relevance, and disconnection from the student's needs," which are some of the statements made by learners regarding this lack of effectiveness (Galbraith & Fouch, 2007; Palis & Quiros, 2014). So to assist in resolving this issue in adult learning, researchers have begun to analyze different methods of improving experiences of the learner using various tools such as shortened presentations and making use of more relevant and interesting materials, in addition to improving and developing concepts of adult learning theories (Galbraith & Fouch, 2007; Palis & Quiros, 2014; Welty, 2010; Woodard, 2007). In a study that addressed some of the flaws specifically, researchers examined key adult learning principles and critical points of presentations as they relate to the abilities of learners (Palis & Quiros, 2014). Adult learning principles that emphasize the relevance and usefulness of the contents, include active and reflective strategies and connect to experience and previous knowledge should be considered to create a meaningful whole (Palis & Quiros, 2014; Woodard, 2007). Additionally, instructional design principles for the planning, preparation and delivery of lectures can transform the lecture into a useful, effective, significant and memorable learning experience. This will, in turn, assist with a possible barrier that may cause learners to not take as much adequate information away from presentations and lectures as they may need (Welty, 2010; Wilkins, 2011).

In another previous study that examined a key method of this research, researchers were able to collect evaluations and retention information from students concerning Pecha Kucha and PowerPoint presentations. In the study, two experiments were conducted that compared student

reaction to and memory of peer presentations using either a fast-paced, images only format (Pecha Kucha) or a traditional PowerPoint presentation (Dermirkesen & Arditi, 2015). These experiments were performed with the careful examination of the learners' attention span and whether they thought that the material being presented was interesting based on the fashion it was delivered from the speaker (Dermirkesen & Arditi, 2015). In both experiments, there were no recall differences, but positive ratings were higher for Pecha Kucha. Unfortunately, based on the data collected, the positive ratings for Pecha Kucha presentations were only due to the students favoring the shorter length of the presentation in comparison to the regular-length PowerPoint presentation (Dermirkesen & Arditi, 2015). These results suggests Pecha Kucha is a useful student presentation style that maintains similar levels of retention (Dermirkesen & Arditi, 2015). This is a good indicator for this research as it seeks to analyze the effectiveness that Pecha Kucha presentations and lectures have on learning and possibly retention capabilities of audience members in safety training.

One key element of occupational safety and health training is that companies are making it mandatory for its employees to complete (Demirkesen & Arditi, 2015; Mythen & Janice, 2011; Wilkins, 2011; Woodard, 2007). In making it mandatory, some employees could potentially neglect the importance of the training due to viewing it as boring, time consuming, or insignificant. As mentioned previously, researchers are looking into adult learning theories to improve the learner's perception and feedback concerning instructional methods within the learning environment as the information relates to what the learners may apply to their tasks and work (Galbraith & Fouch, 2007; Palis & Quiros, 2014). Adult learning theories and practice became increasingly well known in the US during the 20th century for a number of reasons, such as various dimensions of learning, memory, and environmental and cultural factors (Welty,

2010). Most, if not all, of these issues should be addressed when attempting to improve training, so that educators can better instruct learners. When combining these factors with an important learning environment such as occupational safety training, learners could likely develop more interest for the topics, which will lead to improved learning and retention of safety concepts (Palis & Quiros, 2014; Welty, 2010). With the learner feedback on mandatory training in mind, training programs should be more focused and relevant to the learner, and encourage interaction, depending on the needs of the learner (Palis & Quiros, 2014; Welty, 2010). Theory and practice effectively implemented can move the perception of training in a positive direction. This was seen in a study of newly-hired employees and their feedback on the changes in safety training, which used the Knowles' concept of andragogy to improve training methods (Woodard, 2007). This concept seeks to improve adult learning by focusing on improving self-concept, adult learner experience, readiness to learn, orientation to learning, and motivation to learn. In this case, theory and practice did go hand-in-hand. The logical conclusion, therefore, is that Knowles' concept of andragogy and theories of the adult learner does translate to the workplace to increase the effectiveness of new-hire training (Woodard, 2007). Training should also seek to integrate the inclusion of relevance so that trainees understand the objectives of the program, in addition to making them aware of gaps in their knowledge (where they are versus where they need to be) which should be a goal in every training session (Galbraith & Fouch, 2007; Woodard, 2007). Adult learning theory and practice can demonstrably improve an organization's training activities and should be carefully reviewed by both training staff and line management to make training and learning as effective as possible.

CHAPTER 3

Methodology

Participants

The study was conducted with 71 students in an undergraduate occupational safety course at East Carolina University. All of the students in the course were asked to volunteer in the study and those participating were made aware that their identities would remain confidential and no incentives would be provided for participation. Students who agreed to participate were given a consent form to sign, providing information about the study. The research was properly reviewed and gained approval by the Institutional Review Board at East Carolina University and is attached in Appendix A.

Design

The study was designed to examine the effectiveness of Pecha Kucha presentations on the learning and retention abilities of the participants compared with traditional presentations. This only focused on what the learners thought about and took away from the Pecha Kucha in efforts to contribute to the few previous studies that have focused on feedback of the learner. To test the hypothesis, the methods used were modeled after conditions from a previous study done by Seneviratne and Moseworth (2015) that measured parameters of distraction, including the time until first glance away, number of times looked away, and information recall through the use of posttests (Seneviratne and Moseworth, 2015). This model was chosen for this study as it adequately measures the level of distraction amongst the members of the audience, as well as measuring the effectiveness and ability of the presentations to capture and maintain the attention of the audience. Electronic devices, with the exception of cell phones, were not allowed to be

used during this study. Students were allowed to take notes with a pen/pencil and paper, which was not considered a distraction due to the students writing vital information from the presentations. The presenters of both presentation styles were unaware that their presentation would be compared to a different method of delivery. The students were only made aware that they would be participating in an occupational safety training session about occupational noise, while being unaware that two different training methods (PK and traditional) were being conducted. This prevents bias amongst not only the students, but the presenter as well. Similar to the previous study, this study involved a one-way factorial design (the presenters speak without returned interaction from the audience) incorporating two methods of delivery (PK and traditional) as the independent variables. The participants' recall abilities from the presentations was the main dependent variable. Additional dependent variables included number of times looked away, time to first look away, number of distractions per minute, most common type of distraction, information recall (i.e., key safety messages), and thoughts on presentations.

Materials

The materials for this study were few as not much was needed in order to test the hypotheses of the research questions. This procedure used a classroom suitable for each of the presentations that provided the presenters and learners with a feeling of being in a learning environment. For both presentations, the same room was used, equipped with a desktop computer, multimedia projectors, and display screens so that the visual content of presentations were viewed and that there was no difference in the environment for the students in each group. The room was also structured so that external distractions may be kept to a minimum for both the audience and presenter. Limits in distraction helped ensure that the focus of learners was kept on the presenter so that more attention was given to the presentation and not to other irrelevant

surroundings. The layout of the room also allowed a camera to be placed in the front of the area facing the students, which was used to measure the dependent variables of the attention given from students, the most common type of distraction, and the amount of time until their first look away. The camera was placed in a position so that all faces of the students could be seen and its position in front of the audience made its presence obvious to the students in both groups. The implications of using this camera were that it could have likely influenced the attention of the audience, which could have also affected the results of the study. To reduce this influence, the students were told that the video recording would be used only for the purposes of collecting data and not to identify any individual within the audience. Analyzing these dependent variables helped to determine the level of interest the students had between the two presentations types when both groups were compared to each other, which is necessary for answering the research questions regarding these parameters.

The topic for both presentations was the effects of noise on hearing. This topic was selected because it is a targeted topic and is one of the training requirements in OSHA Occupational Noise Standard, 29 CFR 19190.95(k). The Pecha Kucha was presented by a health & safety professional comfortable and experienced with this style of fast-paced presentation. The speaker presented to the students on the effects of occupational noise on hearing. The Pecha Kucha lasted for the prescribed time (6 minutes and 40 seconds), and at the end, students were to provide their feedback. The performance of the regular Traditional (lasting as long as the speaker felt was necessary for this presentation; approximately 9.5 to 10 minutes) presentation was managed in a similar method as that of the Pecha Kucha. The speaker was a Certified Industrial Hygienist who is comfortable with the content and delivery of presentations to a variety of audiences. Each presenter was asked to develop their presentation with the objective

of training students on the effects of noise on hearing and asked to compile 5 multiple choice questions for use as post-tests. The 5 questions used for the post-test were developed by the presenter based on the information provided within their PowerPoint presentations for each training session. The speakers were told that the research team was studying student behavior and reactions during training delivery and that the audience would be video recorded. The speakers did not know the research questions and specifics of the study. The presenter conducting the Pecha Kucha was aware of the researcher's interest in Pecha Kucha, but not of the full details and methodology of the study. The post-test questions were reviewed by an expert panel of academic educators to ensure question wording is fair, understandable, and meets criteria for writing multiple choice questions. The questions were effective and efficient in the way they assess learning, while displaying strength in versatility, reliability, and validity, which are all critical in measuring learning outcomes (Brame, n.d.).

The two post-tests of the concepts within each presentation were also important, because even though the presenters were not using the same content, the students were asked to recall the information presented to them. An immediate post-test (Appendix C for Pecha Kucha; Appendix D for Powerpoint presentation) was given right after both presentations, in which the presenters were asked to leave the presentation room. Two interview questions were also asked by the Primary Investigator in regards to what the students' thoughts were about the presentation styles and if they thought it was a more effective way of learning than either a slower-paced Traditional presentation or a fast-paced shortened presentation that used more pictures than words, depending on the presentation they viewed (view Appendix B for interview questions). The second post-test was administered a few weeks later as it assists in measuring long-term

memory. The content of this test had included the same questions and answers from that of the first test given to the groups.

Also, the video recordings were coded by three coders (the Primary Investigator and two graduate assistants) to observe the interest patterns among the students, each analyzing the videos independently. Before the analysis of the videos, discussion was held between the coders to discuss the checklist used for analyzing the video data, which was developed by the Primary Investigator. Key points in this discussion were that each coder was on similar terms when determining whether or not the students were distracted during the presentations, in addition to the consideration of late students' being included in the data. It was agreed upon between the coders that if a student arrived later than one and a half minutes to the presentation, they would not be used in the data collected due to the likelihood that important messages could be missed during the time the student wasn't in attendance. Similarly, to the methods of the Seneviratne and Molesworth (2015) study, observations of interest from this study looked into the amount of distractions from each student, but only examining head movements and not eye gaze, as well as the initial attention spans of the audience members. Observing the head movements, assumptions were made that if the head moved, for purposes other than taking notes, the students were distracted from the presentation. This data from the video was coded by the three coders for purposes of discussing issues of the data with each other, what was found based on their observations, and reaching a consensus on the results, thus achieving a high percentage in terms of inter-rater reliability (Seneviratne & Molesworth, 2015). For the purposes of validity and reliability in the video analysis, the coders had measured the parameters for five students in each group to ensure a high level of accuracy and precision between results of the coders.

Procedure

The group of 71 students were divided in half into 2 groups based on placement of last name in alphabetical order. Only the last name of the students was used of the purposes of this study in order to keep the identities of the participants anonymous. These students came from a variety of engineering technology majors, and this was their only occupational safety course in their education. Once the 2 groups were formed, one group was randomly assigned as the experimental Pecha Kucha presentation and the other to the control group of the Traditional presentation method. As a measure that the groups are equal in terms of academic performance, the first course examination for all students was compared between the groups to ensure that one group would not presumably perform better than the other during the post-test period. The comparison of this examination, using a t-test, showed equivalent scores between the two groups as the p-value was calculated at p=0.83.

Table 1. Comparison of First Exam Scores

Group	N	Mean	Std. Dev.
Pecha Kucha	35	81.00	8.409
Traditional	36	80.56	9.324

The p-value for this comparison was not used for the purposes of answering a research question or to test hypotheses, but instead, only to ensure that the learning capabilities between the two groups were similar. This was necessary to avoid the issue of having one group performing better than the other during the post-tests due to a group having more students who would do well on the tests when compared to the other group. With the p-value of 0.83, it was determined that there is not a significant difference between the students of the PK and Traditional training

groups, meaning that both groups had similar levels of intelligence going into the training sessions.

A camera placed in the front of the classroom recorded the audience in each presentation for purposes of later review for interest, and if participants were distracted during the presentations. After the presenters were done, they were asked to leave the presentation room and the first immediate post-tests were given right after each presentation. After the post-test had been completed, a focus group session was held to interview the students in each group. Each session, lasted less than five seconds short of 5 minutes for both groups, consisted of two interview questions being asked based on the student groups regarding the presentation they viewed. Two weeks later the second post-test is given regarding the presentations, but only this time, no interview questions were asked. Following the retention test, t-tests were conducted for the purposes of determining the level of significance in the results between both groups in comparing the immediate quiz scores between groups, and comparing retention scores to immediate scores within groups to determine which methods may be beneficial for learning and retention of information. The data from both post-tests were analyzed as quantitative data in addition to the parameters analyzed from the video recording, which can be seen in the top row of the checklists below.

Table 2. Data from Pecha Kucha Training Video Analysis Checklist

Seat Location	Time until 1st distraction (after _ sec)	# of times distracted	Total time of presentation (min)	# of distractions/min	Most common type of distraction
Row 1, Seat 1	10	13	6.67	1.949025487	Casually glanced away

Row 1, Seat 2	12	16	6.67	2.3988006	Casually glanced away
Row 1, Seat 3	1	8	6.67	1.1994003	Casually glanced away
Row 1, Seat 4	7	16	6.67	2.3988006	Checked phone
Row 1, Seat 5	1		6.67		
Row 1, Seat 6	13	16	6.67	2.3988006	Casually glanced away
Row 2, Seat 1	15	2	6.67	0.299850075	Casually glanced away
Row 2, Seat 2	4	5	6.67	0.749625187	
Row 2, Seat 3	12	8	6.67	1.1994003	Casually glanced away
Row 2, Seat 4	5	4	6.67	0.59970015	
Row 2, Seat 5	15	14	6.67	2.098950525	Checked phone
Row 2, Seat 6	24	9	6.67	1.349325337	Casually glanced away
Row 3, Seat 1			6.67	0	
Row 3, Seat 2	16	4	6.67	0.59970015	Casually glanced away
Row 3, Seat 3	13	8	6.67	1.1994003	Casually glanced away
Row 3, Seat 4	14	10	6.67	1.499250375	
Row 3, Seat 5	17	7	6.67	1.049475262	Casually glanced away
Row 3, Seat 6	22	13	6.67	1.949025487	Casually glanced away
Row 4, Seat 1	25	6	6.67	0.899550225	Late/Other Students
Row 4, Seat 2	11	2	6.67	0.299850075	Late/Other Students
Row 4, Seat 3	262	1	6.67	0.149925037	Late/Other Students
Row 4, Seat 4	12	3	6.67	0.449775112	
Row 4, Seat 5					
Row 4, Seat 6	14	18	6.67	2.698650675	Casually glanced away
Row 5, Seat 1	5	9	6.67	1.349325337	Casually glanced away
Row 5, Seat 2	21	9	6.67	1.349325337	Casually glanced away
Row 5, Seat 3	20	5	6.67	0.749625187	Casually glanced away
Row 5, Seat 4					
Row 5, Seat 5	51	10	6.67	1.499250375	Casually glanced away

Row 6, Seat 1	93	5	6.67	0.749625187	Casually glanced away
Row 6, Seat 2					
Row 6, Seat 3	20	3	6.67	0.449775112	
Row 6, Seat 4	15	5	6.67	0.749625187	Casually glanced away
Row 6, Seat 5	13	7	6.67	1.049475262	Casually glanced away
AVERAGED TOTALS	25.43333333	8.137931034		1.179410295	

Table 3. Data from Traditional Training Video Analysis Checklist

Seat Location	Time until 1st distraction (after _ sec)	# of times distracted	Total time of presentation (min)	# of distractions/min	Most common type of distraction
Row 1, Seat 1	25	4	9.5	0.421052632	Casually glanced away
Row 1, Seat 2	45	21	9.5	2.210526316	Other
Row 1, Seat 3	51	10	9.5	1.052631579	Casually glanced away
Row 1, Seat 4	55	12	9.5	1.263157895	Late/Other Students
Row 1, Seat 5	34	8	9.5	0.842105263	Casually glanced away
Row 1, Seat 6	50	16	9.5	1.684210526	Casually glanced away
Row 2, Seat 1	6	6	9.5	0.631578947	Other
Row 2, Seat 2	0	0	9.5	0	
Row 2, Seat 3	24	7	9.5	0.736842105	Casually glanced away
Row 2, Seat 4	15	14	9.5	1.473684211	Casually glanced away
Row 2, Seat 5	9	25	9.5	2.631578947	Casually glanced away
Row 2, Seat 6	19	20	9.5	2.105263158	Casually glanced away
Row 3, Seat 1	34	19	9.5	2	Casually glanced away

Row 3, Seat 2	0	0	9.5	0	Other
Row 3, Seat 3	80	19	9.5	2	Casually glanced away
Row 3, Seat 4	20	8	9.5	0.842105263	Other
Row 3, Seat 5	69	8	9.5	0.842105263	Casually glanced away
Row 3, Seat 6	58	9	9.5	0.947368421	Late/Other Students
Row 4, Seat 1	52	9	9.5	0.947368421	Late/Other Students
Row 4, Seat 2	49	14	9.5	1.473684211	Casually glanced away
Row 4, Seat 3	57	12	9.5	1.263157895	Casually glanced away
Row 4, Seat 4	13	9	9.5	0.947368421	Casually glanced away
Row 4, Seat 5	214	3	9.5	0.315789474	Late/Other Students
Row 5, Seat 1	38	3	9.5	0.315789474	Other
Row 5, Seat 2	73	15	9.5	1.578947368	Other
Row 5, Seat 3	83	9	9.5	0.947368421	Casually glanced away
Row 5, Seat 4	0	5	9.5	0.526315789	Casually glanced away
Row 5, Seat 5	73	6	9.5	0.631578947	Casually glanced away
AVERAGED TOTALS	44.5	10.39285714		1.093984962	

The parameters in the checklist were measured by the coders, where before the coding process began, the 3 coders each picked 5 students that themselves and the other two coders would analyze. Comparing the results of these between the coders assisted with the coders having similar ideologies in terms of what should be observed during the coding process. Once this step was complete and the coders individually coded every student who participated in the training sessions. After all students were analyzed, the coders sat and discussed their findings in addition to any issues encountered in the process. The results obtained by the lead coder was agreed upon by the all coders to be used for the data of this study, as the results of the other two coders were

used to ensure that the findings from the analyzation were accurate. T-test were conducted for the parameters of Time until first distraction and # of distractions per minute, while a Chi-squares test was used for the parameter of Most common type of distraction, for the purposes of determining the level of significance between the PK and Traditional training groups. The results of these analyses and as well as the findings from the post-tests and interview session can be seen in the following section.

CHAPTER 4

Results

The findings of this study were determined based on a quantitative and qualitative analysis of the students in both of the presentation groups. Once the results from both of the presentation groups were calculated, they were then compared to each other in order to measure how each style of presentation performed in terms of the learning, retention and interest impact they had. The results from both of these findings can be seen below in the following subsections. The meaning behind these feedback and numerical values is explained further in the discussion section.

Quantitative analysis

Immediate Quiz

The 5-question quizzes were administered to each group immediately following the training sessions to determine retention. With a p-value of 0.33 calculated from the t-test, it was determined that there was no difference between the scores of the traditional training group and the Pecha Kucha group. Therefore, the alternate hypothesis would be rejected and the null hypothesis would be accepted due to similarities between the immediate quiz score comparison of the two groups. The alternate hypothesis was rejected due to the finding that the PK immediate quiz score was not higher than that of the traditional training group.

Table 4. Comparison of Immediate Quiz Scores

Training Type	N	Mean	Std. Dev.
Pecha Kucha	32	4.44	.564
Traditional	29	4.59	.628

Retention Quiz

A second 5-question quiz was administered to the students two weeks after each presentation for the purposes of testing retention. When the results of this quiz was compared to the immediate quiz scores of the two groups using a t-test, the retention quiz scores of the Pecha Kucha group were slightly lower after 2 weeks (4.44 to 4.22), but with a p-value of 0.25, the scores were determined to not be significantly different.

Table 5. Pecha Kucha Training Quiz Score Comparison

Quiz	N	Mean	Std. Deviation
Quiz Immediate	32	4.44	.564
Quiz after 2 weeks	23	4.22	.850

The retention quiz scores of the traditional training group (4.59 to 4.35) were also slightly lower, but with a p-value of 0.27, the scores were also determined to not be significantly different.

Table 6. Traditional Training Quiz Score Comparison

Quiz	N	Mean	Std. Deviation
Quiz Immediate	29	4.59	.628
Quiz after 2 weeks	17	4.35	.786

With the two p-values calculated, there are similarities in the results of the retention scores as neither are significantly different. Therefore, the alternative hypothesis would be rejected due to the PK group not producing better results than the traditional group, thus the null hypothesis would be accepted due to similarities in results. Attrition rates for participants in both groups

were similar. The Pecha Kucha group dropped from 32 participants to 23, while the traditional training group dropped from 29 to 17.

Video Analysis

Figures and tables from the video analysis of each of the presentations were developed to highlight the number of seconds before the first distraction, the total numbers of distractions for each student, and the number of distractions per minute within each presentation for all students. This information was developed using the checklist found in the methods section. The purpose of analyzing these factors was to determine the level of interest each student displayed for each presentation based on the parameters of distraction found in the columns of the checklist. The types of distractions were also generalized (casually glanced away, checked phone, Other/Late Students, etc.) for the purposes of determining what was considered a distraction, which was used to help calculate the values for the parameters in the checklist.

Table 7. Time until first distraction by Training Group

	Training Group	N	Mean	Std. Deviation	Std. Error Mean
Time until 1st distraction (after _ sec)	Pecha Kucha	32	23.8438	46.66843	8.24989
	Traditional	29	42.9655	41.86158	7.77350

The average time until the first distraction of each group is seen where the Traditional group averaged a time in seconds that was almost double the time of the PK group. Though this is a big difference, which can also be seen in Figure 1, the p-value of these means was calculated to be $p = .099$. Thus, the difference between these values are insignificant and the null hypothesis would be accepted due to the differential insignificance between both groups, in addition to PK methods yielding inferior results when compared to Traditional methods. The alternate

hypothesis would not be accepted because there isn't a significant difference between the two groups where the PK group performed better than the traditional group.

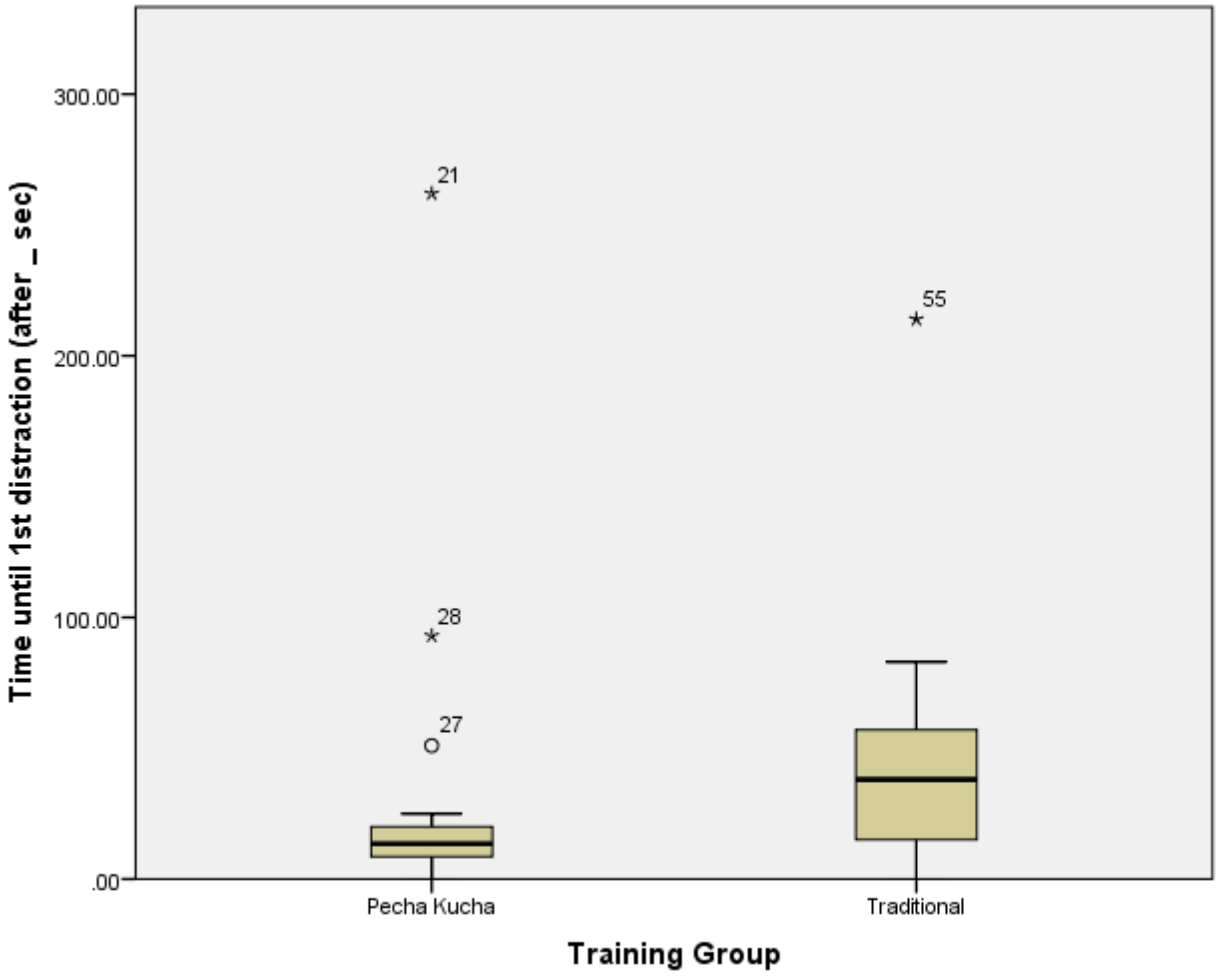

Figure 1. Time until first distraction by Training Group

Figure 1 displays the compared times until the first distraction of the students in each group. The Traditional group had higher times than those of the PK group, although the PK group had a student with the highest time until first distraction between both groups.

Note: Stars with numbers are indicative of outliers; numbers that are beside them are only representative of the individual/subject that was measured within Tables 2 and 3.

Table 8. Number of times distracted by Training Group

	Training Group	N	Mean	Std. Deviation	Std. Error Mean
# of times distracted	Pecha Kucha	32	7.4375	5.04136	.89120
	Traditional	29	10.0345	6.61429	1.22824

The number of times distracted was recorded for both groups (see Tables 2 and 3) and compared using a t-test, in which the results are displayed in Table 8 above. Also, seen in Figure 2 is a visual comparison of the results in Table 8, exhibiting that the Traditional training yielded a slightly higher Mean value than that of the PK training. The p-value for this comparison was calculated to be $p = .088$, thus leading to the determination that the values are not significantly different. The null hypothesis would be accepted as the values show that PK group performed slightly better than the Traditional group, but the difference was not enough to be ruled significant, hence, why the alternate would not be accepted.

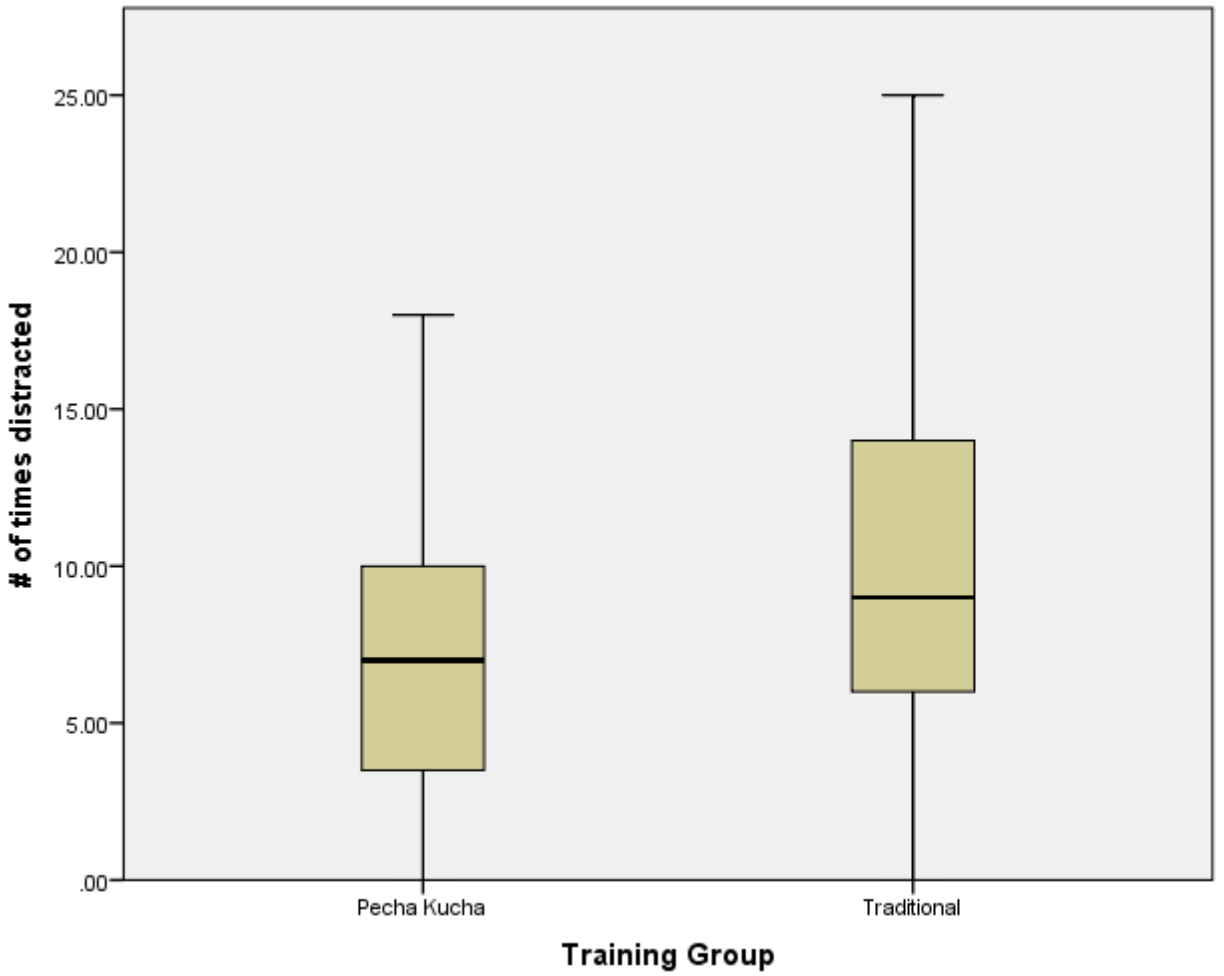

Figure 2. Number of times distracted by Training Group

Figure 2 displays the compared number of times the students were distracted in each group during the training sessions. The Traditional group had higher amounts than those of the PK group, leading to the determination that PK students are likely to be less distracted during training sessions.

Table 9. Distractions per minute by Training Group

	Training Group	N	Mean	Std. Deviation	Std. Error Mean
# of distractions/min	Pecha Kucha	32	1.1057	.76802	.13577
	Traditional	29	1.0563	.69624	.12929

In Table 9, the average number of distractions per minute of each group is seen where the Traditional group averaged an amount that was similar to the amount of the PK group. This was calculated using the "number of time distracted" divided by the "Total time of presentations" in minutes, which can be found in Tables 2 and 3. Though this similarity may also be seen in Figure 3, the p-value of these means was calculated to be $p = .794$. Therefore, the difference between these values are insignificant and the null hypothesis would be accepted. This acceptance is due to the results of this parameter being similar between the PK and Traditional groups when compared to each other, which the alternate hypothesis would not be accepted due to the PK group not being lower than the Traditional group to produce a significant difference.

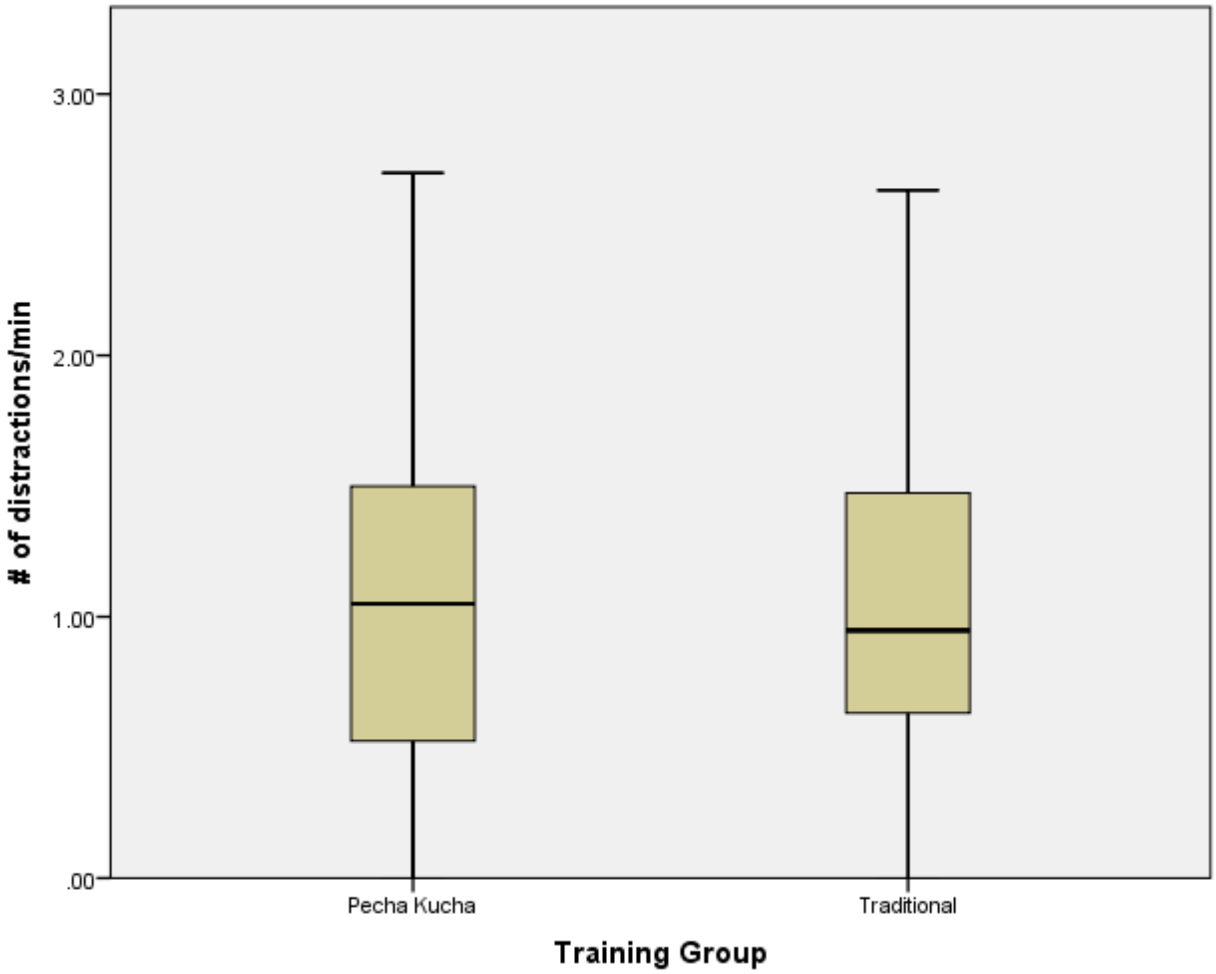

Figure 3. Distractions per minute by Training Group

Figure 3 displays the visual results of the comparison between both groups in terms of the results obtained for the number of distractions per minute. The results with both of these groups are similar as both have almost the same mean for this parameter, thus it was determined that the PK group was just as likely distracted as much per minute during the presentation as the Traditional group.

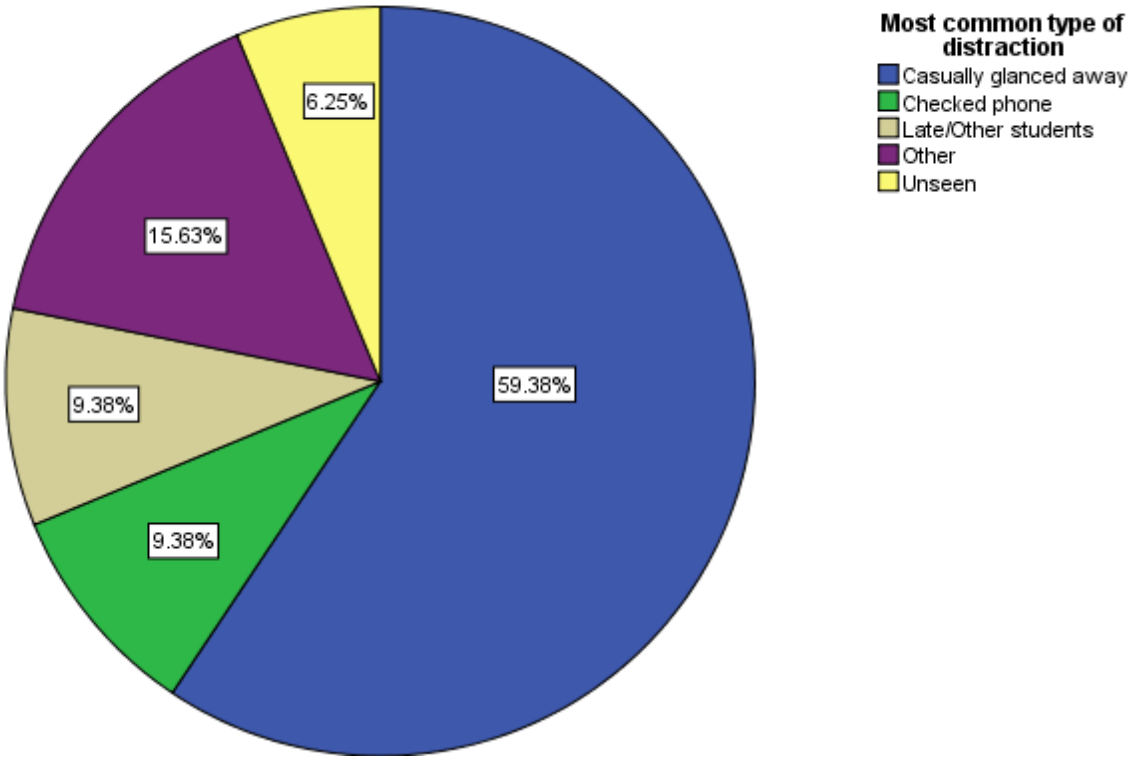

Figure 4. Most Common Type of Distraction: Pecha Kucha

Figure 4 displays the calculated percentages for the most common type of distraction for the PK group. It was determined that the most common type of distraction for this group was casually glancing away, meaning that students briefly were not looking at presentation. The second most common type was other, meaning that students were distracted by other object within their surroundings such as playing with their hair, moving objects around on their desk, etc. For the unseen category, students were unable to be seen due to the camera angle, which there were

either outside of the range of view or other students were sitting between them and the camera, making the unseen student difficult to analyze.

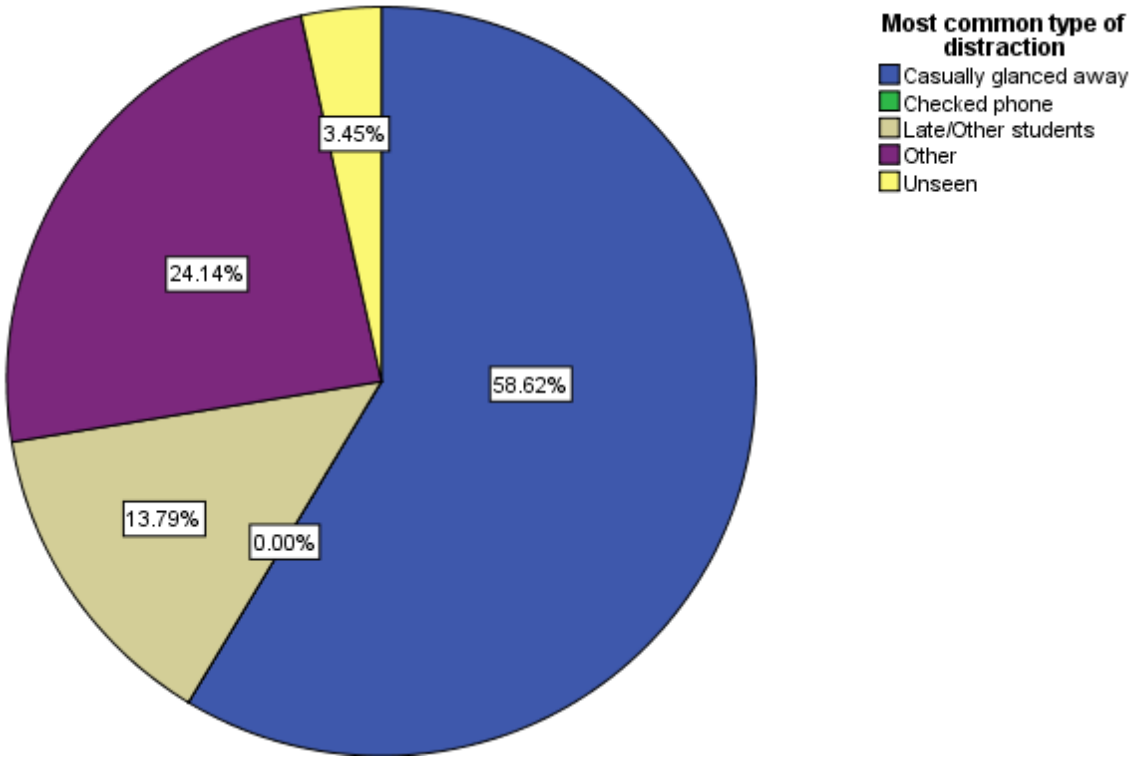

Figure 5. Most Common Type of Distraction: Traditional

Figure 5 displays the calculated percentages for the most common type of distraction for the Traditional group. Most of the results for this group were similar to those of the PK group, in terms of the percentages that were calculated for each category. It was determined that the most common type of distraction for this group was casually glancing away, meaning that students briefly were not looking at presentation. The second most common type was other, meaning that students were distracted by other object within their surroundings such as playing with their hair,

moving objects around on their desk, etc. For the unseen category, students were unable to be seen due to the camera angle, which there were either outside of the range of view or other students were sitting between them and the camera, making the unseen student difficult to analyze.

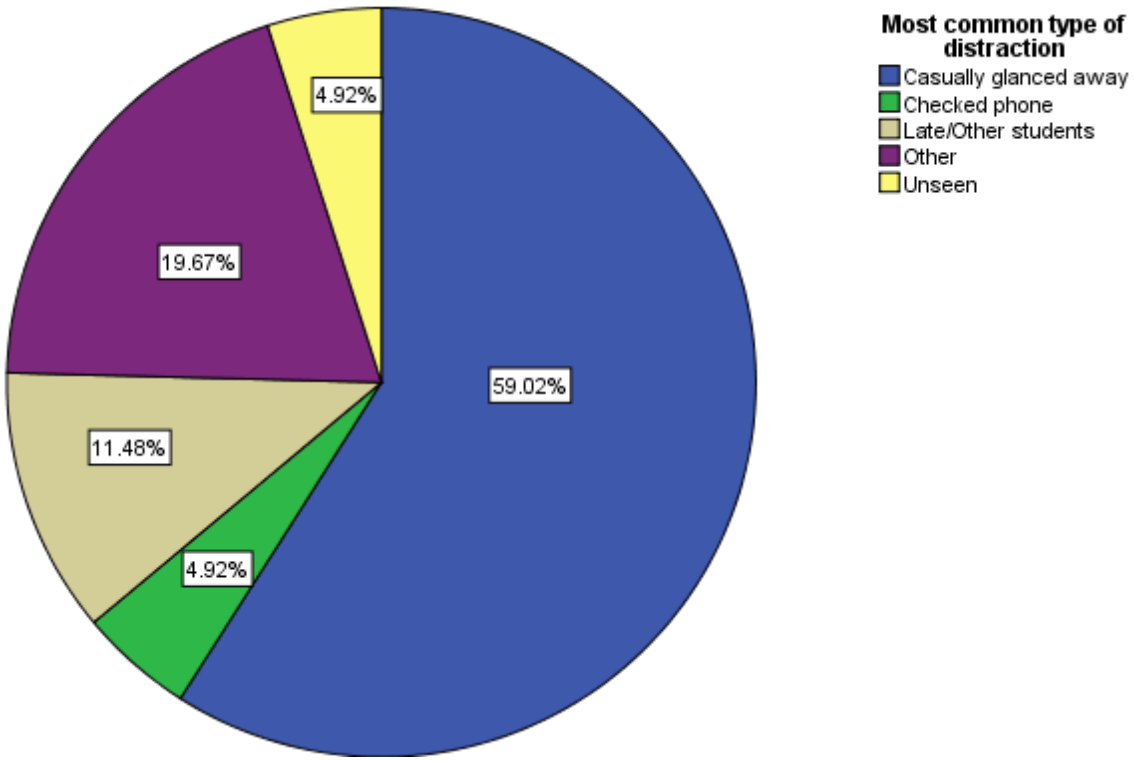

Figure 6. Most Common Type of Distraction: Pecha Kucha and Traditional

Figure 6 displays the most common form of distraction for both the PK and Traditional groups combined. The most common form of distraction was totaled for each group as well as both groups combined and arranged in percentages that can be seen in the figures above. Observing this data displayed in Figures 4, 5, and 6, a majority of the students were mostly distracted in the form of casually glancing away from the speaker. A Chi-squares test was used to calculate the p-value of this data, which determined to be $p = .436$. Therefore, there is not a significant

difference in the relationships between each group and the common distraction types. This means that neither style of presentation had an influence on the type of distraction that students had during the presentation period. Therefore, the null hypothesis would be accepted, and not the alternate, as there are similarities in the most common form of distraction with the students in both groups. The alternate hypothesis would not be accepted due to there not being a significant difference between the two groups for this parameter.

Qualitative Analysis

Immediately after the first post test was given to the students, the focus group session was administered with the previously mentioned questions, where the all of the students within each of the presentation groups were given the opportunity to provide feedback. The feedback obtained from each of the sessions is as followed.

Table 10. Verbal responses from focus group questions

Pecha Kucha Group	Traditional Training Group
Question 1. Based on what was just observed, how interested were you in the presentation style in terms of what you were able to learn from the content?	
Very interested due to: • Was like a sales pitch • Very organized and timely (information presented was in sync with the slides) • Very engaging • Fast paced None expressed disinterest.	Mostly uninterested due to: • Mono-tone style of voice from the presenter • The presentation being very plain and not unique • Very traditional style of presentation Very few were interested due to: • Certain topics within presentation that were relatable to their lifestyle. (i.e. loud music, noisy cities, etc.)
Question 2. Do you think that you could have learned more content from a presentation that was presented in a different style than what you experienced?	

• This would be better in comparison to a longer presentation when learning. • Good for a short presentation; if longer, it probably wouldn't have been as good.	• No because you likely wouldn't have learned as much from a shorter, fast-paced presentation. • Could have used more graphics, pictures, or a video clip within the presentation.

The feedback displayed in Table 10 above shows that PK training received more favorable responses from its participants, while the Traditional training method received more critical responses. This is indicative of PK training receiving more acceptance by the audience when compared to the traditional training.

CHAPTER 5

Discussion

The findings of this study are synonymous with those of previous studies, with most of the similarities of the quantitative analysis being found in the study conducted by Gaze et al. (2012). The following subsections will provide clarity on the findings of this study, in addition to comparing the results of the analyses to other studies.

Quantitative Analysis

After the students were divided into two groups, midterm exam scores of the course they are enrolled in were averaged and compared between each other. This was done to ensure that the students' intellect within both groups were comparable. When the results of this comparison were calculated, it was found that there was not a significant difference with the students between both the PK and Traditional training groups due to a high p-value, which is similar to the findings of Gaze et al (2012). Gaze et al. (2012) found that PK methods of teaching produced either similar or inferior results when students' learning abilities were tested following the presentations. This also supports the ideology of having equivalent levels of intellect between the two groups of this study. If the findings of this had resulted in a significant difference, then there would be a chance that one group of students would more than likely perform better than the other during both posttest sessions. As mentioned previously, the students involved come from a variety of engineering backgrounds as it relates to their major, which may lead to some students having more knowledge on related occupational safety and health issues than some of their classmates.

Examining the immediate quiz results from the first posttest session, the findings are indicative of the groups being able to learn similarly from the presentation styles. Seen in Table 4, both of the scores from the training types had registered at approximately the mid four-point range. The main difference was that the traditional training group had an average immediate quiz score that was .15 points higher than that of the PK training. Also, the traditional training scores had a standard deviation that was .64 points higher than that of the PK training. When factoring in the p-value of 0.33, the findings suggest that the results of the immediate test are not significantly different. In this case, the null hypotheses regarding the learning abilities would be accepted, meaning that the two presentation styles are determined to have a similar impact on the immediate learning abilities of the audience members. The alternate hypothesis would not be accepted for this data as the PK training did produce better results than the Traditional training

Looking into the retention portion of the posttest that was administered two weeks later, the findings resulted in favor of the traditional training style as the average scores of the second test were higher than those of the PK training style. As seen in Tables 3 and 4, which displays the totals of the quiz scores between both groups, the average scores in both groups had decreased when compared to the scores of the immediate posttest. The PK training style average quiz scores differed by 0.22 points between the immediate and retention tests, while the average quiz scores of the Traditional training style differed by 0.24 points. This is indicative of the students in the PK group's ability to very slightly recall the information presented to them 2 weeks prior to the retention test. However, it should be mentioned that in both tables, it is evident that the scores of the PK were lower than those of the Traditional training in both posttests, giving indication that the Traditional training style may have an advantage in comparison. This could be likely due to the Traditional methods' ability of being more

elaborative than PK methods on key points in the presentation as a result of having more time to present, which could assist learners with better retention of information.

When statistically comparing the results of the retention test between both groups using a t-test, it can be seen that the Pecha Kucha had a lower p-value, which was 0.02 points lower than the p-value of the traditional retention score. Both of the values ($p=0.25$) and ($p=0.27$), are greater than the level of significance and thus, it can be statistically determined that the scores of the immediate and retention tests between both groups are not significantly different. This is also evident that the null hypothesis would be accepted in this case as the comparative results between both the PK and Traditional scores are similar when observing the means and standard deviations between the two. As mentioned previously, the Pecha Kucha and Traditional training groups each had a decline in the amount of individuals who participated in the retention test when compared to the amount who took the first post test. This decline in individuals could possibly have an effect on the scores due to the likelihood that some of the higher or lower scoring students may not have been present for the retention test.

Additional measures where used to quantify the level of interest students displayed in each presentation by examining parameters related to distraction for each student. To obtain the results of this portion of the analysis, physical feedback via the body language of the students was examined. This aided in determining the level of interest in each presentation amongst the students based on a few key parameters. The parameters that were measured for interest, which are also displayed in Tables 2 and 3, are

- Time until first distraction,
- # of distractions per minute,
- and most common type of distraction.

Describing the first parameter, the time until the students' first distraction was calculated based on the moment between the time the presenters began their presentation and the first time the students glance away due to a distracting occurrence. The distracting categories are highlighted as:

- Casually glanced away,
- Checked phone,
- Other/Late Students,
- And Other.

The parameters measured from the video recording assists with determining if the verbal feedback given by the students is in agreement with the distraction amounts calculated. The first parameter mentioned is the amount of time between the beginning of the presentation and the first distraction of each student, which was measured in seconds. Displayed in Table 7, the difference in the average time in seconds before the first distraction is more in favor of the Traditional training group. When comparing the means of both training groups, the average time for the Traditional group is almost twice the amount of the PK average. These values show that more individuals were distracted earlier from the presentation in the PK group as opposed to the later time calculated in the Traditional group. Visually, Figure 1 exhibits the differences in times between the two groups, where it can be seen that the PK group have more outliers with a larger time as well as the highest time between the two groups. However, it is evident, based on this figure, that the Traditional group has larger time values than those of the PK, in addition to one high valued outlier within the group. With the performance of the t-test for this parameter, a p-value of 0.09 was calculated, which falls outside of the level of significance ($p < .05$). With this p-value, though it was very close, there is not a significant difference between the means of the

two groups. Thus, the null hypothesis would be accepted in this case as the PK training group produced inferior results in comparison to the Traditional training group. The PK group did not perform better than the Traditional group to produce a significant difference in this parameter, which is why the alternate hypothesis would not be accepted.

The second parameter helps to determine the number of distractions per minute for each individual in both groups. This calculation factors in the total number of times each student became distracted as well as the amount of time for each presentation. Further examining this variable, the number of distractions for both groups is displayed visually in Figure 2, in addition to the totals averaged for both groups, as seen in Table 8. In both graphics, the Traditional displays higher values in terms of group averages and the total number of times distracted for each individual. To calculate the number of distractions per minute, in addition to the total number of times each student was distracted during the presentations, the total presentation times were factors also. The time of each group can be seen in Tables 2 and 3, under the columns labeled as "Total time of presentation," which is measured in minutes in whole numbers. While the number of distractions were an important parameter in calculating the number of distractions per minute, the duration of distraction was a variable that wasn't analyzed for this study. This is a critical variable as there were instances in both training sessions where students were distracted a few times throughout the presentation, but the distractions had lasted over a course of minutes and in one case, throughout most of the presentation. This would have provided additional information for the analysis in regards to giving exposure to students who were distracted during training sessions for a longer duration, though they were distracted fewer times.

Table 9 displays the means of the distraction amounts per minute for each group, while Figure 3 provides a visual depiction of the numerical range of parameter for both groups. In

Table 9, the means are similar for both groups with each averaging approximately 1 distraction per minute, though the PK group was larger very slightly. Figure 3 displays the same portrayal of the data, where both groups also have the similar values in numerical ranges, with their highest values falling within the 2.5 to 3.0 distractions per minute. When observing the p-value (0.794) for this parameter's t-test, it can be determined that the means are not significantly different, as this value is far greater than the level of significance being used ($p < 0.05$). With this finding, the null hypothesis would be accepted in this case as the PK training yielded similar results to that of the Traditional training group, which is also the reason why the alternate would not be accepted, due to PK not yielding results of better performance and statistical significance for this parameter. This is a new finding which was not covered by previous studies that could be helpful in explaining the level of interest within learning environments if researchers and educators are able to develop method of improving.

As mentioned previously, types of distractions were stated which were used to determine if a distractive occurrence had happened. To clarify the characteristics of some of the distraction types, 'Casually glanced away" can best be described as an occurrence when an individual glanced away from the speaker, and directs their attention to another entity such as the floor, perpendicular walls, windows, doors, etc. "Late/Other students" can be described as when one student is distracted by the actions of another student, whether the other student is late or shuffling objects around at their desk, or any other similar disturbance. "Other" can be best explained as any additional actions, not including note-taking, that may have redirected the students' attention away from the presenter, such as playing with hair, twiddling of thumbs, etc. In addition to those mentioned above, another factor in this case would be the individuals that were unseen during the video analysis. These individuals were positioned in a way that they

could not be measured due to the camera angle, though they had still taken the posttest given afterwards.

Looking into the types of distractions for both presentation groups, Figures 4, 5, and 6 displays the number of individuals in each group who were distracted via the variables listed. The numbers are portrayed in percentages for each group as well as the total percent for both groups combined. This information shows that the most common form of distraction amongst the students in both groups was when they had casually glanced away, while the other variables had similar values within each group. The totals for "Other" and "Late/Other students" are also indicative that a good portion of the students were commonly distracted by other factors than what the majority had experienced. Based on the p-value obtained ($p = .436$), it can be determined that values between these groups are not significantly different. Thus, the null hypothesis would be accepted that the groups displayed similarities in the most common form of distraction for each student. The alternate hypothesis would not be accepted as this parameter was not affected by the training methods enough to cause a difference between the two groups.

Qualitative Analysis

In addition to the video analysis that had taken place, verbal responses were analyzed from the focus questions provided at the end of the first posttest. The main focus of the questions was to obtain the thoughts of the students concerning the presentations that they had watched and to gather information on how interesting they thought their presentation was. Looking into the data collected in Table 10, it can be determined that the Pecha Kucha training group had more positive feedback on the first question than the Traditional group, as no student gave a response that the PK presentation was not interesting. Combining this with responses such as "sales pitch," "fast paced," and "very engaging" for the PK, a good case can be made

that more students were interested in this style of presentation and learning. While it is evident that the Traditional group's responses were mostly negative considering the student thought the presentation style used a "mono-tone style of voice" and being "very plain and not unique," this presentation style did receive positivity from a few individuals. A couple of students had mentioned that they had gained interest in the training as there were a few slides containing topics that were "relatable to their lifestyle" as topics included common noise hazards within and outside of the workplace such as city traffic and loud music. This supports previously mentioned findings in research done by Zierold et al. (2012) and Kim et al. (2011), where the workers and younger adults expressed concerns that the current safety training methods lacked meaningfulness and didn't relate to what they experienced.

The second question asked to the students was whether they would be able to learn better from the other style of presentation than the style presented, though it was not mentioned to them that the other style of presentation was being conducted to the other group. Examining the feedback of the PK group, their responses were generally that it was better than the longer presentations that they are used to viewing. The students in this group also mentioned that it likely wouldn't have been as good of a presentation if it were similar in length to the class presentations they see on a daily basis. Interestingly, the Traditional training methods received mixed responses in positive and negative feedback. The negative feedback from the students was that the Traditional method could have used more multimedia material, including graphics, pictures, and video clips, within the presentation to assist with the learning experience. This supports the statement made by Nakayama & Jin, (2015), Zierold et al. (2012), and Kim et al. (2011), which mentions that more engaging and interactive methods would be more beneficial in the learning environment. On the contrary, the Traditional training method did receive positive

feedback as a few of the students thought that if the presentation content was delivered in a style that was shorter and fast-paced, then there would be a chance that they wouldn't have learned as much. This is indicative that while traditional methods may not be beneficial to some students, a few prefer this style over other methods that could include PK.

CHAPTER 6

Conclusion and Future Research Suggestions

Though this study was completed, in terms of administering the presentations, post-tests, interview session, and data collection and analysis, there were limitations encountered that could have likely had an impact on the results of the experiment. If some of these limitations were addressed beforehand, then the results of this study would be more reliable with the data that was collected. There are areas where this study lacked in strength, in which the lessons learned could provide a starting point for future studies to build from.

Limitations

The limitations of this study could critical to the results that were found from the data, which could potentially be avoided by future studies and yield results with increased validity and reliability. One of the limitations is that there is only one instance when data is collected to represent the population under study. Also, this study is completed with a majority of the learners being between the age of 18 and 24. This portrayed only the results in regards to younger adults who are still in college, and not older adults, in which most workplace facilities consists of both age groups. There also were issues with the coders when observing the videos to complete the checklists for each student. Issues concerning what was considered a distraction had developed while analyzing the videos, as questions on whether note-taking was considered a distraction. The Primary Investigator clarified this question as note-taking was not considered a distraction as students were writing down key notes from the presentation. This was mentioned in addition to the assumption being made that if a student was looking down while writing during the presentation, they were taking notes and listening to the presenter. Future studies should

make sure to address the possibility of this occurrence in order to readily clarify any issues concerning what is considered a distraction. Limitations in the use of equipment were also a constraint in this study. Due to the camera angle during both training sessions, three students' reactions to the presentations were unable to be seen, which in turn, could have affected the qualitative data. The camera angle in future studies should be able to capture all of the individuals participating, even if that means using multiple cameras to capture reactions. This will aid in providing more accurate quantitative data for parameters such as those in Tables 5, 6, and 7, which could lead to more truthful p-values in t-tests due to the visibility of all students. The duration of distraction would also be another variable that would be useful for analyzing in future studies. As mentioned previously, there were instances where some students were distracted very few times, but the duration of the distractions were longer than those other students. This parameter would further assist in determining the level of interest that individuals exhibit in training sessions as it takes into consideration another measurement for distraction in training sessions.

Another limitation to this study was that only students who were enrolled in an undergraduate occupational safety course participated in the experiment. This is not representative of an actual workplace population, but only that it displays how well the training sessions were portrayed by students. This study utilized students who may not at the time understood the importance of occupational safety training or had other conflicting matters that could likely affect the outcome of the experiment. In both training sessions, there were students were either late to the training session or participated in the first posttest session and not participate in the second session.

In observation of the possibilities beyond this study, this study only examines the effectiveness of PK methods only within occupational safety training, as well as only using one standard to test these methods. One standard was used to train the students for the sake of time, as there was not much to work with. With more time to use, there is the possibility of exploring if more safety training procedures and standards would be as equally effective when compared to each other. Also, there is the possibility of using PK instructional methods in virtual/on-line environments as opposed to face-to-face instruction, to see if students would prefer and learn better from this method of delivery.

Recommendations for Future Research

Based on the limitations of this study, the shortcomings experienced should be considered to ensure that future studies are less likely to encounter them. To acquire more accuracy and precision within the results, more than one trial should be done so that more results may be obtained for comparison purposes. The duration of the experiment was limited to just two weeks, therefore, retention of the presentation materials could be better examined if a longer duration of data collection was attainable. The questions of the post-tests is an area that could be investigates as well. As stated in the Methods section, the presenters were asked to develop their own questions to test the students with in regards to the presentations given. This could lead to the presenters providing clues on key points that the students should keep in mind during the post-test. To avoid this, future studies should seek to avoid having the presenter involved with generating questions for the post-test, and instead, place this responsibility on the researchers. This could be done by having researchers generate questions related to the content of the presentations during a practice presentation held before the period of experimentation. Achieving this would aid in having the presenter focus on important concepts of the presentation

and not on information they know will be on the post-test. Also, observing the methods of previous studies such as those utilized by Weible et al. (2002), future experiments should look into learning abilities of older adults as various working environments are composed of personnel with ages ranging from teenagers to older aged adults. This could provide a comparison between the two age groups to examine which group learns more effectively using PK methods. Because this is study is based on the ideology of occupational safety training, future studies should utilize an actual workplace environment where the participant are all working employees who may experience the occupational safety hazard topic presented to them. This would be a better indicator of the targeted study population which looks into the effects of more engaging methods on working individuals in occupational safety training. With the working population in mind, future studies should also seek to compare PK methods to Traditional methods within an on-line, virtual, or archived learning environment. On-line, virtual, and archived methods would provide better access to training content, in which workers would be able to view training presentations at their own convenience and pace, instead of relying on the timing of face-to-face training sessions to obtain information, which may be inconvenient with time. With the idea of timeliness in mind, the condensed training methods may be more appealing to workers who are on conflicting schedule, but are required to participate in OSH training. As mentioned previously in the Introduction, workers in some instances view OSH training as a waste of time, in addition to being less enthusiastic in attending sessions. With the implementation of PK methods, it would be of interest to see if actual workers would prefer the methods of this training style over traditional methods, as well as examining trends in learning and retention of information when compared to traditional methods. Also, there were inconsistencies in the amount of student between post-test sessions, as student

amounts in both groups saw a reduction in attendance to the retention test held two weeks after the immediate post-test. In efforts to maintain consistency throughout the experiment, future studies should take as much action as possible to ensure that late participants are kept to a minimum (if not kept out altogether), in addition to ensuring that the individuals who participate in the first posttest session will participate in the second session. This would lead to a better indication of the results, in terms of precision and accuracy, as both posttest sessions will be administered to people who will attend both as well as who viewed the presentations.

Looking beyond the scope of this study, more potential lies in what future studies could discover with the lessons learned from this study. In terms of occupational safety training, future studies should investigate how effective are PK methods of training when providing instruction on additional safety training procedures and standards, to see if results similar to those of this study would be found. Also, future research studies should seek to expand the possibilities of what PK instructional methods could provide in educating learners not only in occupational safety and health, but in various industries. One of the capabilities of PK learned from this study was that it has the potential to become generalized into other educational settings. The training sessions that were conducted for this study had taken place in a classroom where the setting is mostly comparable to any other classroom or setting that has the ability to display multimedia presentations to an audience. With this in consideration, there is the possibility that PK instructional methods could be used for purposes other than the transfer of knowledge obtained from presentations into daily use. Based on the comments provided from some of the students in this study, PK has the characteristics of a "sales pitch" in addition to being engaging and timely, which could be used for other purposes such as persuasion in important issues or catalyzing behavior change. This gives the potential for different horizons to be explored beyond the scope

of this study in regards to what PKs could offer learners who may rely on more visual and engaging methods of learning.

Conclusion

This study contributes to the previous research examining Pecha Kucha as it the first study concerning this topic that observes body language of the audience during the presentation. As mentioned previously, the study integrates methods from adult learning principles to assist with accommodating the needs of the audience in term of what they need to learn from the PK presentation. Parameters associated with the students' abilities to learn, in addition to their levels of interest and distraction were measured for the purposes of determining how the PK style of training would compare to traditional methods. The methodology for this study was based on the presenters, as students provided their thoughts on the speakers' performance during the training session, in addition to a performance assessment of the post-test questions provided by the speakers, and video analysis of both training sessions that measured the students interest in terms of how much each were distracted during the presentation. The findings from this study are similar to previous studies done by Gaze et al (2012) and Seneviratne and Molesworth (2015) as the PK yielded similar post exam scores to those of the traditional training, which was also what Gaze et al. found. This study also show that the students had better reactions to the PK training when their responses were collected in the qualitative data, similar to what was also determined in the Gaze et al. study. When using a more engaging method to instruct the audience, the PK also had slightly better values in terms of the distraction parameters measured, which is similar to the results of the Seneviratne and Molesworth (2015) as their values were better when using humor in aviation pre-flight safety videos. None of these findings displayed a significant difference when compared using a t-test as a result of the similar outcomes. This may be

beneficial for PK methods of training and instruction as learners could possibly receive the same type of training in a more shortened, engaging format than that of a traditional style training session or lecture. With these findings and additional research, PK instructional methods could be generalized to provide instruction in various industries other than OSH.

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Appendices

Appendix A. IRB Approval Form

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Notification of Initial Approval: Expedited

From:	Social/Behavioral IRB
To:	Stacy Freeman
CC:	Michael Behm
Date:	3/21/2016
Re:	UMCIRB 16-000027 Comparing the Learning Effects Between Traditional PowerPoint Presentations and Pecha Kucha Presentations

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 3/18/2016 to 3/17/2017. The research study is eligible for review under expedited category # 6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Informed Consent Doc	Consent Forms
Pecha Kucha and PowerPoint Posttest Questions	Standardized/Non-Standardized Instruments/Measures
Pecha Kucha PostTest Interview Questions.docx	Interview/Focus Group Scripts/Questions
Presentation Video Analysis Coder Checklist	Additional Items
StacyFreeman_PechaKucha Thesis.docx	Study Protocol or Grant Application

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

Appendix B. Post-test Interview Questions

Post-test 1 Interview Questions:

1. Based on what was just observed, how interested were you in the presentation style in terms of what you were able to learn from the content? If the presentation was interesting or boring, why did you think that?

2. Do you think that you could have learned more content from a presentation that was presented in a different style than what you experienced?

Appendix C. Pecha Kucha Group Post-test Questions

Noise and Hearing Loss

1. What are the two action levels for 8 hour exposure to noise and the instantaneous sound level for hearing loss?

    a. 80 db and 85 db
    b. 85db and 100 db
    c. 85 db and 140db
    d. 90 db and 140 db

2. Which part of the ear contains little hairs that if damaged will result in hearing loss?

    a. eardrum
    b. cochlea
    c. Tympanic membrane
    d. Anvil

3. What is the phrase for the relationship of distance to lower decibels?

    a. Triple Distance to Drop 6dB
    b. Double Distance to Drop 6dB
    c. Double Distance to Add 6dB
    d. Triple Distance to Add 6dB

4. Which is not an example of Engineering Controls to limit exposure to noise?

    a. Lubrication of machinery
    b. Enclosing the machinery
    c. Keeping your distance from the machinery
    d. Placing a barrier between the machinery and employee

5. Exposure at work may have caused what percentage of Americans to have hearing loss?

a. 5%
b. 15%
c. 20%
d. 25%

Appendix D. Traditional Group Post-test Questions

Noise and Hearing Loss

1. The effects of noise on hearing are dependent on:

    a. Your age, diet and exercise
    b. Your age, lifestyle and how often you wear ear phones
    c. The intensity of noise, age and diet
    d. The intensity of noise, duration of noise and how often you are exposed

Answer: d.

2. Noise exposure above this level can damage hearing:

    a. 80 dB
    b. 82 dB
    c. 85 dB
    d. 90 dB

Answer: c.

3. Hear loss occurs in what portion of the ear:

    a. Auditory Nerve
    b. Cochlea
    c. Ear Drum
    d. Staples

Answer: b.

4. Hearing loss:

    a. Can be corrected by surgery
    b. Is permanent
    c. Only happens at old age
    d. Can be corrected with a hearing aid

Answer: b.

5. A rule of thumb for noise being too loud is you have to shout to be heard at:

    a. 3 feet
    b. 4 feet

c. 5 feet
d. 6 feet

Answer: a.