Hemp Cannabinoids Therapeutic Effects

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Abstract

This investigation examines the effectiveness of an e-learning module called "The Therapeutic Benefits of Hemp" in improving sales representatives' understanding and views on hemp-derived products. The research was driven by the issue of insufficient knowledge about hemp compounds among sales staff and their customers, potentially leading to misinformation and reluctance to suggest such products.

The study's research questions focused on the e-learning module's contribution to enhancing participants' comprehension, satisfaction levels, and the identification of knowledge deficits and areas for improvement. A Design-Based Research (DBR) methodology was utilized, employing instruments like the Quizizz summative evaluation and a Likert scale survey to gauge participants' knowledge and satisfaction.

The research involved 30 sales representatives from diverse backgrounds with an interest in the hemp product industry. The research methods encompassed the creation and implementation of the e-learning module, followed by data gathering and analysis to evaluate its efficacy.

The study's conclusions demonstrated a positive impact on participants' understanding of hemp-derived products, high learner satisfaction with the e-learning module, and the identification of knowledge shortcomings and areas for enhancement. Recommendations for improving the module were offered based on the research findings.

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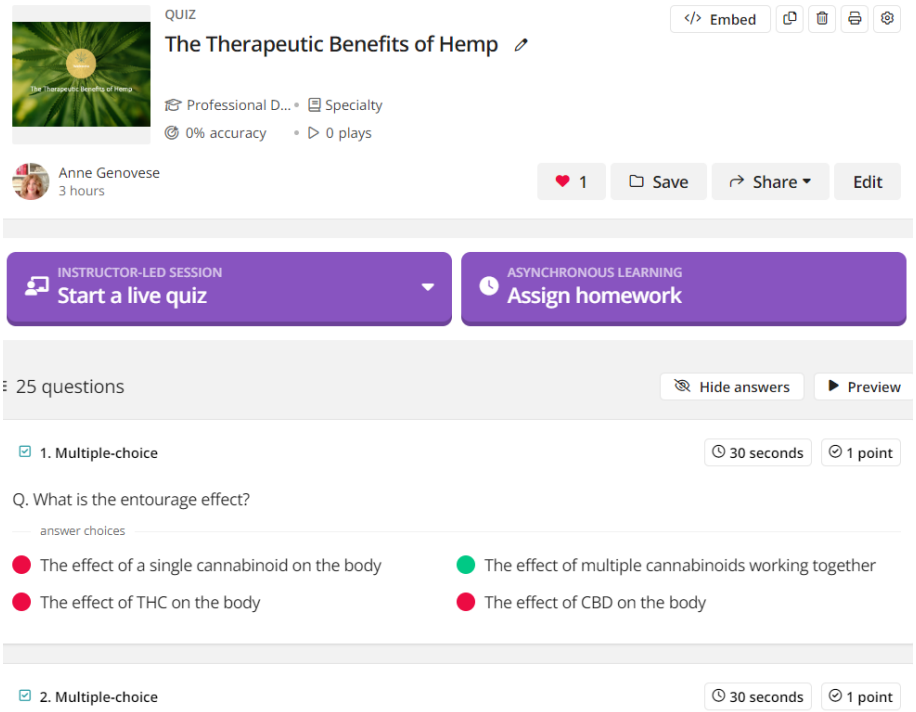
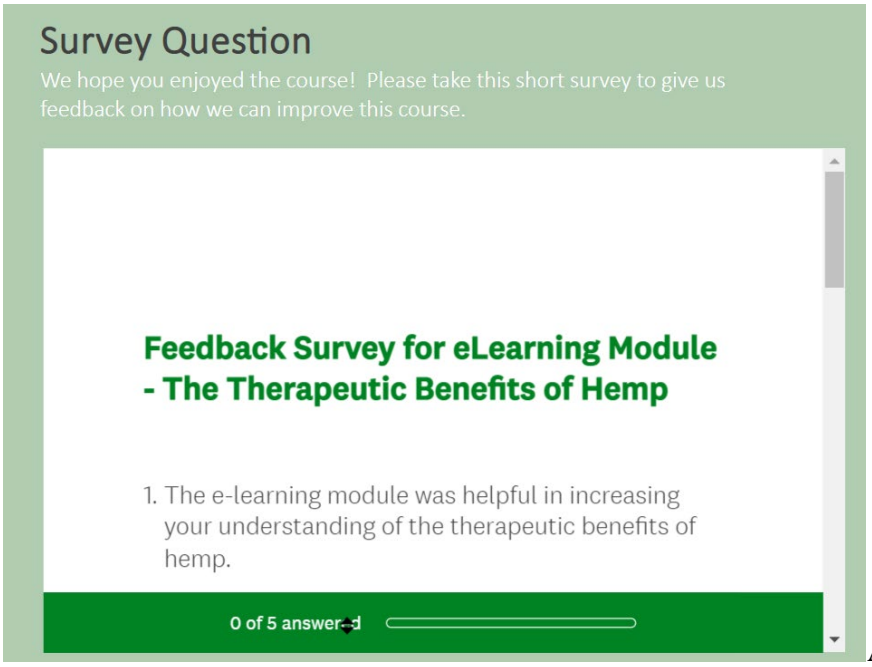




Chapter 1: Introduction

Instructional Problem

Instructional Problem: The instructional problem that the e-learning module will address is the lack of knowledge and skills among adult learners regarding the proper usage, benefits, and potential side effects of CBD, CBG, CBN and the Entourage Effect, and how they can help to achieve the goals and motivations of maintaining health and well-being, improving physical performance, alleviating symptoms of chronic pain and improving the overall quality of life. This lack of knowledge and skills may negatively impact their ability to communicate effectively with customers and achieve their goals and motivations. It may also impact their confidence and success in their role as salespersons. (Tracey, 2012)

Research Problem

Despite recent increases in the popularity and accessibility of hemp-based products, there is a lack of comprehensive understanding among consumers about the various compounds found in hemp, such as CBD, CBG, and CBN, and how they interact with one another in the body for the entourage effect. This lack of understanding may lead to confusion about the potential therapeutic benefits of these compounds and the best ways to use them.

The research problem is important to investigate because adult learners currently lack knowledge and skills regarding the proper usage, benefits, and potential side effects of CBD, CBG, and CBN tinctures and salves. This lack of knowledge and skills may be due to a lack of education and resources available on these products and their potential uses. This lack of knowledge and skills can negatively impact the ability of adult learners to communicate

effectively with customers, achieve their goals and motivations, and negatively affect their confidence and level of success in their role as salespersons. This research will help to address this problem by providing education and resources to adult learners, which will help to improve their knowledge and skills in this area and ultimately lead to better communication with customers, improved physical performance, and better overall quality of life. The impact on learners includes a lack of ability to effectively communicate with customers, sell effectively, and achieve their goals.

Research Purpose

The purpose of this research is to investigate the potential therapeutic benefits of CBD, CBG, CBN, and the entourage effect, and to understand the concept of the entourage effect and how it may impact the effectiveness of hemp-based products. The research will also aim to provide a better understanding of these compounds and the ways in which they interact with one another for consumers.

Research Question(s)

1. What is the impact of the e-learning module on learners' knowledge of hemp-based products as measured by assessments?
2. What are learners' perceptions of the design of the module as measured by post-survey?

Chapter 2: Literature Review

Introduction to the Literature Review

The literature review for this research focuses on four main themes: the "Entourage Effect" of CBD, the therapeutic potential of phytocannabinoids, the potential of the endocannabinoid system in treating pain, and the differences between hemp, marijuana, and CBD. The first theme, the "Entourage Effect" of CBD, refers to the idea that CBD is more effective when used with other cannabinoids and compounds found in the hemp plant. The second theme, the therapeutic potential of phytocannabinoids, specifically focuses on CBN and CBG. The third theme, the endocannabinoid system and its potential in treating pain, discusses the potential of the endocannabinoid system in treating pain, specifically the role of the endogenous cannabinoid system in migraine and the differences between preclinical and clinical evaluations of cannabinoids for pain management. The fourth theme, the differences between hemp, marijuana, and CBD, focuses on the distinctions between hemp, marijuana, and CBD, which are all related products of the cannabis plant. This literature review provides a comprehensive understanding of the various topics related to the cannabis plant, its compounds and the potential benefits they may have.

"Entourage Effect" of CBD

The literature review for this research focuses on the theme of the Entourage Effect in cannabis. The Entourage Effect is the synergistic interaction between cannabis compounds,

including cannabinoids, terpenes, and flavonoids, found in the hemp plant. (Study Shows Cannabis Terpenes Provide Pain Relief, Contribute to 'Entourage Effect,' 2022). The literature suggests that these compounds work together to produce a more powerful impact than they would if used individually. (What Is the Entourage Effect? All You Need to Know, 2022). This theme of the Entourage Effect in cannabis presents a consistent pattern of the potential benefits of using full-spectrum CBD products that contain a variety of cannabinoids and other compounds found in the hemp plant, as opposed to CBD isolate products that only contain CBD. (Sanchez-Ramos, 2022) The sources also suggest that the Entourage Effect is thought to increase CBD's therapeutic potential, with potential benefits such as pain relief, inflammation, anxiety, fungal infection, epilepsy, and cancer. (Fogelberg, 2020)

The Therapeutic Potential of Phytocannabinoids

CBD, or cannabidiol, has gained immense popularity in recent years as a potential healthcare solution for various conditions such as chronic pain, insomnia, and anxiety. There appears to be a pattern of increasing interest and commercialization in cannabinoids, particularly CBD, as potential healthcare solutions for various conditions. (Dawidowicz, 2021) However, there are also concerns about the lack of scientific evidence supporting these claims and potential safety issues. Newer cannabinoids, such as CBG, THCV, and CBN, have also been discovered and commercialized. (Harvard Health, 2022) Yet, most of the current data on these compounds comes from animal studies, so more research is needed to determine their effectiveness in humans. A study by the Salk Institute found that CBN, a cannabinoid

similar to THC but not psychoactive, has the potential to treat age-related neurodegenerative diseases by protecting nerve cells from oxidative damage. (Active Ingredient in Cannabis Protects Aging Brain Cells, 2022) Another study by Oregon State University found that a pair of cannabinoid acids found in hemp, CBGA and CBDA, can bind to the SARS-CoV-2 spike protein, blocking a critical step in the process the virus uses to infect people. (Oregon State Research Shows Hemp Compounds Prevent Coronavirus From, 2022) These compounds are not controlled substances like THC and have a good safety profile in humans, and were found to be equally effective against variants of SARS-CoV-2.

The Endocannabinoid System and Its Potential in Treating Pain

This theme discusses of the endocannabinoid system and its potential in treating pain. The first source, "Uncovering a Connection Between Cannabinoids and Migraine" (2022), discusses the research being conducted by the University of Arizona Health Sciences Comprehensive Pain and Addiction Center on the molecular steps that lead to migraines, with a focus on the endogenous cannabinoid system. The second source, "Kinsey" (2023), explains the different types of cannabinoids and their effects on the body, and the third source, "Cannabinoids, the Endocannabinoid System, and Pain" (n.d.), discusses the use of preclinical laboratory animal models to investigate the effects of cannabinoid-based interventions on pain, and the challenges of conducting clinical trials with cannabis and cannabinoids. A pattern among the sources is that they all discuss the endogenous cannabinoid system, which includes compounds that originate from within the body, similar to cannabinoids found in the Cannabis sativa plant. These compounds act by binding to CB1 and CB2 receptors, located on nerve cells

in the central and peripheral nervous systems, to reduce inflammation or relieve pain. Also, all the sources discuss the potential of the endocannabinoid system in treating pain and the challenges of conducting clinical trials with cannabis and cannabinoids.

Understanding the Differences Between Hemp, Marijuana and CBD

The topic of this theme is the distinctions between hemp, marijuana and CBD, which are all related products of the cannabis plant. They have different characteristics, such as the level of THC concentration, the psychoactivity, and the products they are used to produce. (Full-Spectrum CBG: What It Really Means, 2021b) The legality, effects and potential health benefits of these products are also discussed. (Malone, 2021) Also discussed is the regulatory environment of how hemp products can be sold throughout the US with state department of agriculture approval. (Hemp Vs. Marijuana | Think Hempy Thoughts, n.d.) The patterns from the sources agree that hemp, marijuana, and CBD are all related products of the cannabis plant, but have different characteristics and legal status. They also agree that the main difference between hemp and marijuana is their THC concentration, with hemp having low THC and marijuana having high THC.

Conclusion

One of the main ideas that stood out from the literature review was the concept of the Entourage Effect and the potential benefits of using full-spectrum CBD products that contain a variety of cannabinoids found in the hemp plant. This information highlights the importance of

understanding the synergistic interactions between different compounds found in the hemp plant, and how they may impact the effectiveness of CBD products. This will inform the next steps of the research project by providing a framework for understanding how different compounds found in the hemp plant may interact with one another to produce a more powerful impact.

Another key finding that stood out to me was the therapeutic potential of phytocannabinoids such as CBN and CBG. The literature suggests that these compounds have the potential to treat age-related neurodegenerative diseases by protecting nerve cells from oxidative damage and can bind to the SARS-CoV-2 spike protein, blocking a critical step in the process the virus uses to infect people. This information highlights the need for further research on the therapeutic potential of these compounds, and how they may be used to treat various conditions such as Covid19.

The literature review provided valuable information that will inform the design of a solution for the instructional problem by highlighting the importance of understanding the Entourage Effect, the therapeutic potential of phytocannabinoids such as CBN and CBG, the potential of the endocannabinoid system in treating pain and the differences between hemp, marijuana and CBD. These findings will guide the design of instructional materials that will provide adult learners with education and resources to improve their knowledge and skills in this area. The research will inform the instructional design by focusing on providing more detailed information on the potential benefits of these compounds and how they may be used to treat various conditions, the endocannabinoid system and its potential in treating pain, the challenges of conducting clinical trials with cannabis and cannabinoids, and the legal status and potential therapeutic benefits of these products.

Chapter 3: Research Methodology

Instructional Problem Overview

The instructional problem is a lack of knowledge and skills among adult learners regarding the proper usage, benefits, and potential side effects of CBD, CBG, CBN and the 'Entourage Effect'. These adult learners will need to understand how these phytocannabinoids can help to maintain health and well-being, improve physical performance, alleviate symptoms of chronic pain, and improving overall quality of life. They will need to communicate effectively with customers to achieve their sales goals. Obtaining this knowledge may increase their confidence and success as salespeople.

The instructional problem was identified during a conversation with key stakeholders from a hemp manufacturing company. The company specializes in producing hemp-based products such as CBD, CBG, and CBN tinctures and salves for various retail distributors. The stakeholders expressed their concern that their salespeople lack the knowledge and skills necessary to communicate the benefits of these products to customers effectively. This lack of knowledge and skills is negatively impacting the sales of these products and the company's bottom line.

During the conversation, stakeholders provided examples of salespeople being unable to answer customer questions about the products and not being able to communicate the benefits of these products in a clear and persuasive manner. They also expressed their concern that this lack

of knowledge and skills among salespeople may lead to customers purchasing products that are not suitable for their specific needs.

The stakeholders emphasized the importance of providing salespeople with the knowledge and skills they need to communicate the benefits of these products effectively. They expressed their willingness to invest in an e-learning module that will provide salespeople with the necessary knowledge and skills to effectively communicate the benefits of these products to customers. The stakeholders also expressed their desire for a flexible, self-paced learning environment that will accommodate the busy schedules of their salespeople and allow for a continual flow of learning.

Potential Solutions

1. Online course on the proper usage, benefits, and potential side effects of CBD, CBG, CBN and the 'Entourage Effect'.

a. The digital tools that would be used to support this solution include an online course platform, such as Canvas or Blackboard, video lectures, interactive quizzes, and discussion forums. The course will be created on authoring software such as Articulate 360.

b. One advantage of implementing this solution is that it would provide adult learners with a flexible, self-paced learning environment that allows them to learn at their own pace and on their own schedule. This can increase their engagement and motivation to learn.

c. One possible challenge that could make the implementation of this solution difficult is the lack of technical knowledge and skills among the adult learners.

i. To address this challenge, we would provide support and resources for adult learners to help them navigate the online course platform and digital tools. This could include tutorials,

online support, and in-person workshops to help them become more comfortable with the technology. Additionally, we could also create a peer-support system, where more technically-savvy learners can mentor and support their peers.

2. Role-playing activities

a. The digital tools that would be used to support this solution include online platforms, such as Zoom or Google Meet, and worksheets or scripts for the role-playing activities.

b. One advantage of implementing this solution is that it would provide adult learners with an opportunity to practice and apply the knowledge and skills they have learned in a simulated, real-world scenario. This can help them to build their confidence and prepare them for communicating effectively with customers.

c. One possible challenge that could make the implementation of this solution difficult is the lack of participation from adult learners.

i. To address this challenge, we would provide incentives for participation, such as prizes for participation. We would also encourage participation by making the role-playing activities as relevant as possible to the learners' job responsibilities and by providing clear instructions and guidelines for the activities.

3. Gamified learning experience

a. The digital tools that would be used to support this solution include a gamified learning platform, such as Kahoot or Quizlet, interactive quizzes, and leaderboards.

b. One advantage of implementing this solution is that it would provide adult learners with an engaging and interactive learning experience. It can increase their motivation to learn and retain the information. Also, it can make the learning process more enjoyable and fun.

c. One possible challenge that could make the implementation of this solution difficult is the lack of interest in gaming among adult learners.

i. To address this challenge, we would make sure to tailor the gaming elements to the adult learners' interests and preferences. We could also provide options for learners who may not be interested in gaming, such as traditional quizzes or other assessment methods. Additionally, we could also offer a variety of games or activities to cater to different learning styles, such as trivia, puzzles, or matching games.

I have chosen the first solution, an online course on the proper usage, benefits, and potential side effects of CBD, CBG, CBN and the ‘Entourage Effect’, as the best option to address the instructional problem.

One key advantage of this solution is the flexibility it offers to adult learners. The online course platform provides a self-paced learning environment, which can increase engagement and motivation to learn. Additionally, the use of video lectures, interactive quizzes, and discussion forums can provide a variety of learning experiences and opportunities for learners to apply and practice the knowledge and skills they have acquired.

Another advantage is that this solution can be easily scaled to reach a large number of adult learners at any time. Online courses are accessible from anywhere, which can be beneficial for learners who live in remote areas or have a busy schedule. Moreover, this solution is cost-effective, as it does not require any additional materials or equipment.

Overall, the online course solution offers a flexible, accessible and cost-effective way to address the instructional problem and provides adult learners with a variety of learning experiences and opportunities to apply and practice their knowledge and skills.

E-Learning Unit of Instruction Description

1. Module Title: "The Therapeutic Benefits of Hemp "

Module Description: This e-learning module is designed to help salespeople gain the knowledge and skills necessary to communicate the benefits of hemp-based products like CBD, CBG, and CBN to customers effectively. The module covers the proper usage, benefits, and potential side effects of these phytocannabinoids, as well as the concept of the Endocannabinoid System and the "Entourage Effect." The module is flexible and self-paced, allowing salespeople to learn at their own convenience.

Target Audience: Salespeople from a hemp manufacturing company specializing in producing hemp-based products such as CBD, CBG, and CBN tinctures and salves.

2. The learning goal of the module is to provide adult learners with knowledge and skills regarding the proper usage, benefits, and potential side effects of CBD, CBG, CBN, the Endocannabinoid System, and the 'Entourage Effect' so they can communicate effectively with customers and achieve their sales goals.

The discussion provided in the instructional solution explains how the solution aligns with the learning goal. The instructional solution is an online course that aims to provide adult

learners with knowledge and skills related to the proper usage, benefits, and potential side effects of CBD, CBG, CBN, the Endocannabinoid System, and the 'Entourage Effect'. This is in line with the learning goal of the module, which is to provide adult learners with the same knowledge and skills so they can communicate effectively with customers and achieve their sales goals.

The solution highlights several advantages that align with the learning goal. The online course offers a flexible and self-paced learning environment, which can increase engagement and motivation to learn. The use of video lectures, interactive quizzes, and discussion forums provides a variety of learning experiences and opportunities for learners to apply and practice the knowledge and skills they have acquired. These elements are designed to help adult learners achieve the learning goal.

Additionally, the solution being an online course offers the advantage of accessibility and scalability. This can benefit adult learners who live in remote areas or have a busy schedule, as the course is accessible from anywhere. Furthermore, the cost-effectiveness of the solution aligns with the goal of providing adult learners with knowledge and skills in a cost-effective manner.

Overall, the instructional solution provides a logical discussion of how it aligns with the learning goal, offering a flexible, accessible, and cost-effective way to address the instructional problem while providing adult learners with a variety of learning experiences and opportunities to apply and practice their knowledge and skills.

3. Learning Objectives

Objective 1: By the end of this course, the learner will be able to explain what is the Endocannabinoid System and how it helps the body to retain homeostasis.

Objective 2: At the end of the course, the learner will be able to explain the specific therapeutic benefits of CBD, CBG, and CBN

Objective 3: By the end of this course, the learner will be able to demonstrate the concept of the Entourage Effect and its role in hemp-based.

a.

The formative assessments, which consist of 6 assessments including knowledge checks, drag-and-drop exercises, and scenario-based activities, provide opportunities for learners to apply and practice their knowledge and skills. These assessments align with the learning objectives as they cover key concepts such as the Endocannabinoid System, the therapeutic benefits of CBD, CBG, and CBN, and the concept of the Entourage Effect. For example, the knowledge check on the Endocannabinoid System aligns with Objective 1, which requires the learner to explain what the Endocannabinoid System is and how it helps the body retain homeostasis. Similarly, the drag-and-drop exercise on cannabinoids and phytocannabinoids aligns with Objective 2, which requires the learner to explain the specific therapeutic benefits of CBD, CBG, and CBN.

The summative assessment includes matching, multiple choice, and true-false questions on the entire content of the lesson and provides a comprehensive evaluation of the learner's understanding of the material. The questions consist of multiple choice, true and false, drag and drop and matching questions. There are 25 questions, with the learner needing an 80% score to pass. This aligns with the learning objectives as it assesses the learner's ability to demonstrate their understanding of the key concepts covered in the course.

The instructional solution includes both formative and summative assessments, which are critical components in ensuring that adult learners are able to meet the learning objectives and achieve the learning goal of the module.

In conclusion, the formative and summative assessments in the instructional solution align well with the learning objectives and provide a comprehensive way to assess adult learners' understanding of the key concepts covered in the module. These assessments play a crucial role in ensuring that the adult learners are able to meet the learning objectives and achieve the learning goal of the module.

4. Two different learner needs that might be encountered while implementing the e-learning module are:

Limited prior knowledge of the subject matter: Some learners may not have any prior knowledge of CBD, CBG, CBN, the Endocannabinoid System and the 'Entourage Effect,' so it's important to provide a clear and concise explanation of the basic concepts.

Different learning styles: Some learners might be visual learners and prefer videos, while others might be more auditory or kinesthetic learners and prefer interactive activities and assessments.

a. To address these learner needs, the module will:

Provide clear explanations of the basic concepts through a combination of videos and text.

Use interactive activities, assessments, and knowledge checks to engage learners and reinforce their understanding of the content.

For example, to address the need for clear explanations, the module will include a video that provides an overview of CBD, CBG, CBN, the Endocannabinoid System, and the 'Entourage Effect.' This video will use simple language and visuals to make the concepts easy to understand for learners with limited prior knowledge.

To address the different learning styles, the module will include interactive activities, assessments, and knowledge checks that allow learners to apply the information they have learned and reinforce their understanding. For example, a knowledge check will be included after each video to assess learners' comprehension of the information presented.

5. The two e-learning tools used in the module are video and knowledge checks.

a. Videos will be used to provide clear explanations of the basic concepts and engage learners with the content. Knowledge checks will be used to assess learners' understanding of the information presented and reinforce their learning.

6. The e-learning module addresses the instructional problem by:

Providing learners with a comprehensive understanding of CBD, CBG, CBN, the Endocannabinoid System, and the 'Entourage Effect' through videos and text.

Engaging learners with interactive activities, assessments, and knowledge checks to reinforce their understanding and provide immediate feedback on their performance.

Ensuring that learners have the necessary knowledge and skills to communicate effectively with customers by including practical examples of how to communicate the benefits of these products in a clear and persuasive manner.

For example, the module includes a video that provides practical information for communicating the benefits of the Endocannabinoid System and the 'Entourage Effect' to customers. The videos will provide learners with examples of how to respond to common customer questions and demonstrate how to communicate the benefits of these products in a clear and persuasive manner. Another example is the interactive activity that asks learners to apply what they have learned by picking correct responses to scenario-based dialogue on specific hemp-based product. This will give learners the opportunity to practice communicating the

benefits of these products and receive feedback on their performance. Lastly the interactive knowledge checks throughout each section allow learners to verify and feel confident of the information obtained.

Research Methodology Method

The present study will utilize a quantitative research design to investigate the impact of an e-learning module on learners' knowledge of hemp-based products and their perceptions of the module's design. The study will use a Linkert survey and formative and summative assessments to collect data from the participants.

The choice of a quantitative research design is appropriate for addressing the research questions of the study. The first research question seeks to determine the impact of the e-learning module on learners' knowledge of hemp-based products, which requires a systematic and structured approach to data collection and analysis. A quantitative research design allows for the collection of empirical data that can be analyzed statistically to draw conclusions about the impact of the e-learning module.

The second research question seeks to explore learners' perceptions of the design of the module. A quantitative research design is appropriate for this research question as it allows for the collection of standardized data through a post-survey that can be analyzed statistically to identify patterns and trends in learners' perceptions of the module's design.

In summary, the present study will utilize a quantitative research design to investigate the impact of an e-learning module on learners' knowledge of hemp-based products and their

perceptions of the module's design. The study will use a Linkert survey and formative and summative assessments to collect data from the participants.

Participants/Stakeholders

The study will involve a total of 30 participants and stakeholders. The participants will be professional salespeople, and all have some college education, ranging from 2-year degrees to master's degrees. They have a moderate background in hemp-base products. The stakeholders will include the owners of a manufacturing company and a retail fitness center. The age of the participants range from 30 years of age to 65 years old. Participants are both male and female and are of various ethnicities.

The e-learning module will be delivered online via laptops, computers, or tablets through Articulate 360 Review. They will be taking the online module at their own pace.

The sampling method for participants and stakeholders in the study will be purposive and convenience sampling. "A convenience sample is the one that is drawn from a source that is conveniently accessible to the researcher. A purposive sample is the one whose characteristics are defined for a purpose that is relevant to the study." (Andrade, 2021) Convenience sampling is a non-probability sampling technique where participants are chosen based on their availability and willingness to participate. In this study, the participants and stakeholders will be chosen based on their affiliation with the manufacturing company and retail fitness center, and their willingness to take the e-learning module.

Since the participants and stakeholders in this study will all have some college education and be professional salespeople, the study will target those who are most likely to sell hemp-based products in their professional roles. The goal is to obtain a diverse group of participants that represent different age ranges, genders, and ethnicities to ensure that the results can be generalized to a wider population.

Data Collection Instrument(s)

The present study will use two data collection instruments: a Likert survey embedded in the e-learning module and a summative assessment administered through a Quizizz link.

The Likert survey is designed to measure learners' perceptions of the e-learning module's design. It will be embedded in the e-learning module and administered through Survey Monkey. The Likert survey will consist of a series of statements that learners will rate on a scale from strongly agree to strongly disagree. The Likert survey is aligned with Research Question 2, which seeks to explore learners' perceptions of the design of the module. The Likert survey will provide quantitative data that can be analyzed statistically to identify patterns and trends in learners' perceptions of the module's design.

The summative assessment is designed to measure learners' knowledge of hemp-based products. It will be administered through a Quizizz link and will consist of multiple-choice questions similar to the formative assessments throughout the e-learning module. The summative assessment is aligned with Research Question 1, which seeks to determine the impact of the e-learning module on learners' knowledge of hemp-based products. The summative assessment

will provide quantitative data that can be analyzed statistically to draw conclusions about the impact of the e-learning module on learners' knowledge.

In summary, the present study will use a Likert survey embedded in the e-learning module and a summative assessment administered through a Quizizz link as the data collection instrument. The Likert survey is aligned with Research Question 2, while the summative assessment is aligned with Research Question 1. The use of these instruments will provide quantitative data that can be analyzed statistically to address the research questions of the study.

Data Analysis Technique(s)

The present study will use quantitative data analysis techniques to interpret the data collected through the Likert survey and the summative assessment.

The Likert survey data will be analyzed using descriptive statistics, specifically frequency distribution and measures of central tendency. The frequency distribution will provide information about the frequency of each response option for each item in the survey. Measures of central tendency, such as mean and median, will provide information about the central values of the responses and their spread. These analyses will allow for the identification of patterns and trends in learners' perceptions of the design of the e-learning module.

The summative assessment data will be analyzed using an independent samples t-test. The experimental group will consist of learners who received the e-learning module, and the control group will consist of learners who did not receive the e-learning module. The control group will be selected randomly from a similar population and will be administered the same summative

assessment at the same time as the experimental group. The scores of the two groups will be compared using an independent samples t-test to determine whether there is a significant difference in their scores, providing evidence of the impact of the e-learning module on learners' knowledge of hemp-based products.

The results of the Likert survey and the summative assessment will be presented using tables and graphs to facilitate the interpretation of the data.

In summary, the present study will use quantitative data analysis techniques to interpret the data collected through the Likert survey and the summative assessment. The Likert survey data will be analyzed using descriptive statistics, while the summative assessment data will be analyzed using an independent samples t-test. These analyses will allow for the identification of patterns and trends in learners' perceptions of the design of the e-learning module and provide evidence of the impact of the e-learning module on learners' knowledge of hemp-based products.

Expected Timeline

March 1, 2023: Start of the study, identify the research problem, and develop the research questions.

March 3, 2023: Develop the research design, including the sampling strategy, data collection instrument, and analysis techniques.

March 18, 2023: Obtain ethical approval for the study.

March 21, 2023: Recruit study participants and schedule the interviews and surveys.

March 24, 2023: Begin data collection, including in-depth interviews and Likert surveys.

March 30, 2023: Complete data collection and begin data analysis.

April 02, 2023: Complete data analysis and summarize the findings.

April 3, 2023: Prepare the report and draw conclusions based on the study results.

April 4, 2023: Submit the final study report, which includes a detailed analysis of the data, the findings, and the conclusions.

This timeline allows for a comprehensive study that is thorough and efficient, taking into account the time required for data collection, analysis, and report preparation. It also allows for a brief buffer period, which can be useful for addressing unforeseen circumstances or delays in the research process.

Data Security and Confidentiality

The Student Investigator will ensure the security and confidentiality of the study's data during collection, analysis, and storage. All information obtained from the survey and summative assessment will be kept anonymous, and no personally identifiable information will be collected.

To maintain data security, all digital data will be stored on a password-protected computer, with access limited to the Student Investigator. The computer will also have up-to-date antivirus software installed, and regular backups of data will be made to prevent data loss in case of any technical failures.

During data collection, hard copies of the consent forms and surveys will be stored in a locked filing cabinet, with access limited to the Student Investigator. Once data collection is complete, all hard copies of the data will be securely destroyed.

The Student Investigator will analyze the data without personally identifying any participants, and any reporting of results will be done in aggregate. The Student Investigator will not disclose any individual participant's data or results to any third party.

Any breaches of data security or confidentiality will be reported to the appropriate parties immediately, and steps will be taken to mitigate any potential harm caused. (Retention of Research Records and Destruction of Data | Research, n.d.)

Conclusion

In conclusion, Chapter 3: Research Methodology outlines the research approach, design, and methods for investigating the effectiveness of an e-learning module on salespeople's knowledge and perceptions of hemp-based products. The research methodology adopted is a quantitative research design, utilizing convenience sampling methods. The study will involve 30 participants who are professional salespeople approximately 30-65 years of age and college-educated. The chosen solution is an online course that offers a variety of learning experiences and opportunities, with formative and summative assessments to assess learners' understanding of the material.

Data collection instruments for the study include a Likert survey and a summative assessment, which will be used to gather data on learners' perceptions of the e-learning module's design and their knowledge of hemp-based products, respectively. The study will use quantitative data analysis techniques, including descriptive statistics and independent samples t-

test, to interpret the data. The expected timeline for the study is from March 1, 2023, to April 4, 2023, with a buffer period for unforeseen delays.

To ensure the security and confidentiality of the study's data, the student investigator will keep all data anonymous and securely store digital and hard copies of data. The student investigator will not disclose any individual participant's data or results to any third party, and any breaches of data security or confidentiality will be reported immediately. Overall, this research methodology provides a comprehensive approach to investigating the impact of an e-learning module on salespeople's knowledge and perceptions of hemp-based products, while ensuring the privacy and security of the participant’s data.

Chapter 4: Results

Summary of Research

The primary goal of this Design-Based Research (DBR) study was to explore the impact of an e-learning module on salespeople's understanding and perceptions of hemp-based products. Conducted in an online learning environment, the e-learning module was accessible via various devices such as laptops, computers, or tablets through the Articulate 360 Review platform.

The research problem focused on the development of an engaging and efficient e-learning module to enhance salespeople's knowledge of hemp-based products. This knowledge encompassed the Endocannabinoid System, the therapeutic advantages of CBD, CBG, and CBN, and the Entourage Effect. By improving salespeople's expertise in these areas, they would be better equipped to convey the benefits of these products to their customers.

A total of 30 professional salespeople, aged between 30 and 65 years old and possessing some college education, participated in the e-learning intervention. With varying degrees of familiarity with hemp-based products, participants engaged with the module at their convenience, provided feedback on its design, and completed assessments to evaluate their comprehension of the subject matter.

Additionally, the study involved other stakeholders, including a manufacturing company's owners and a retail fitness center's management. They contributed to the intervention by offering insights on the e-learning module's content and design, facilitating participant recruitment, and supporting the implementation within their respective organizations.

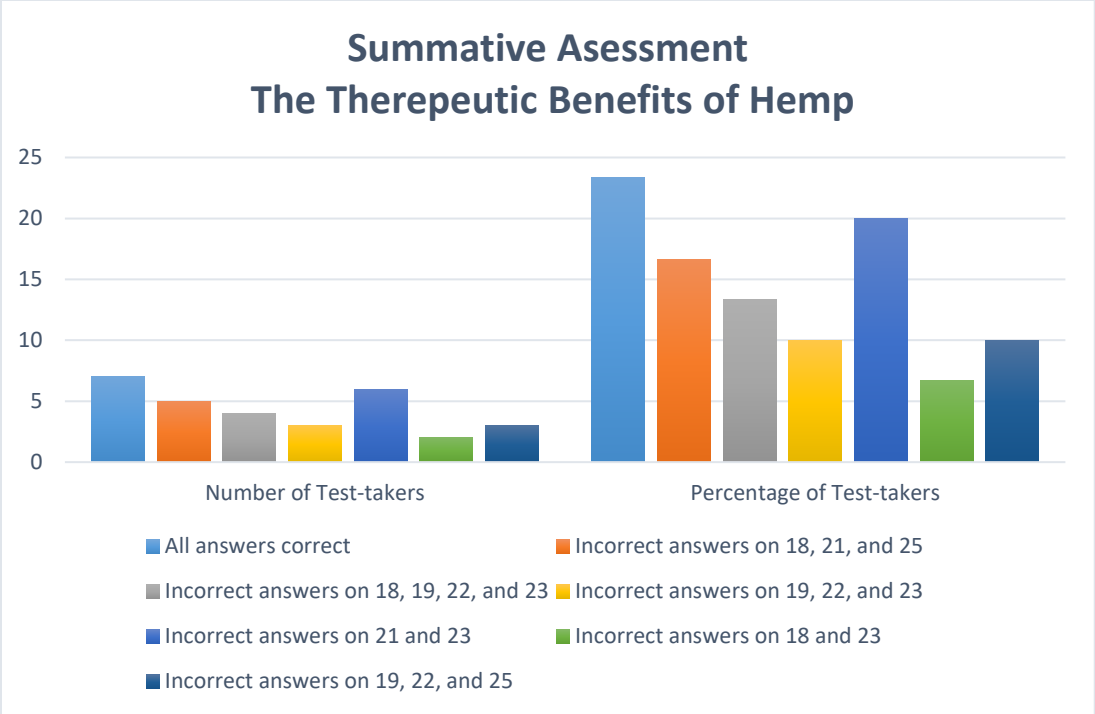
In terms of data collection, we utilized two primary tools: a Likert survey, integrated into the e-learning module, gauged learners' opinions on the module's design, and a summative assessment,

administered via a Quizizz link, assessed their knowledge of hemp-based products. Employing these quantitative data collection instruments allowed for a structured analysis of the e-learning module's influence on the participants' understanding and perceptions.

To summarize, the DBR study provided an in-depth evaluation of the e-learning module's effectiveness in improving salespeople's knowledge and perceptions of hemp-based products. The research design, active engagement of participants, roles of stakeholders, and data collection methods supplied valuable information regarding the module's efficacy, ultimately enhancing salespeople's ability to communicate the advantages of hemp-based products to their customers.

Summary of Results

The summative assessment Quizizz results reveal the knowledge of 30 participants regarding hemp's therapeutic benefits. Their understanding varied, as shown in the data below:

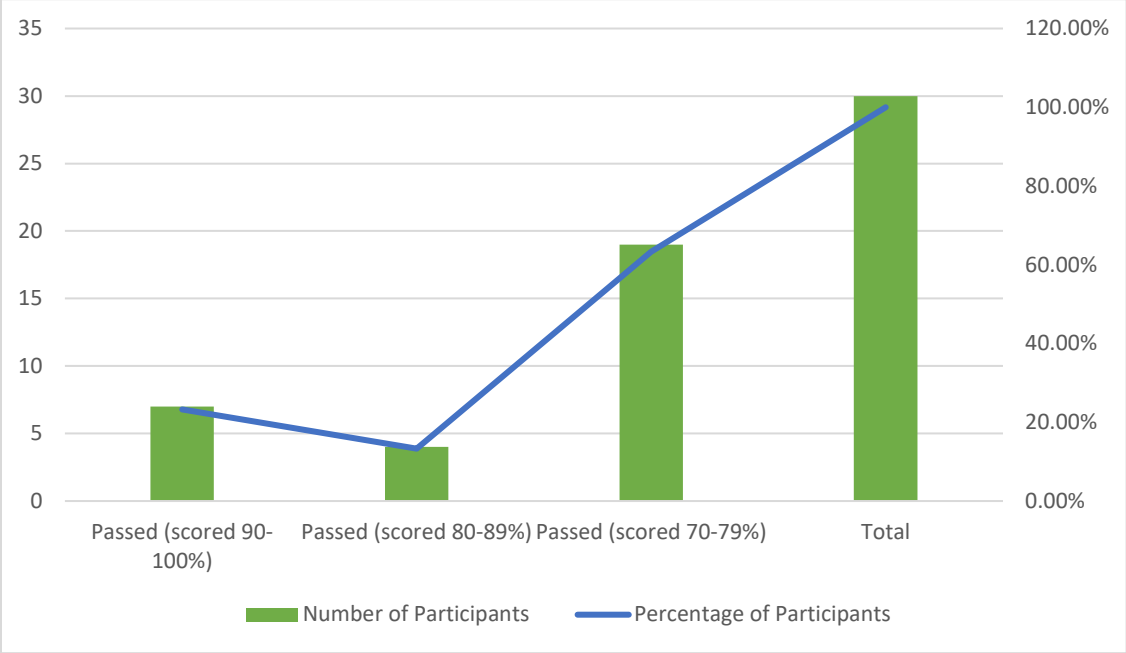


The frequent incorrect answers suggest that the learners had difficulty understanding certain topics. For instance, some learners did not understand how CBG and CBN interact with the endocannabinoid system. The learners were also unclear about which cannabinoids helped with treating Parkinson's disease, Huntington's disease, and Crohn's disease. The learners also did not understand the neuroprotective effects of specific cannabinoids.

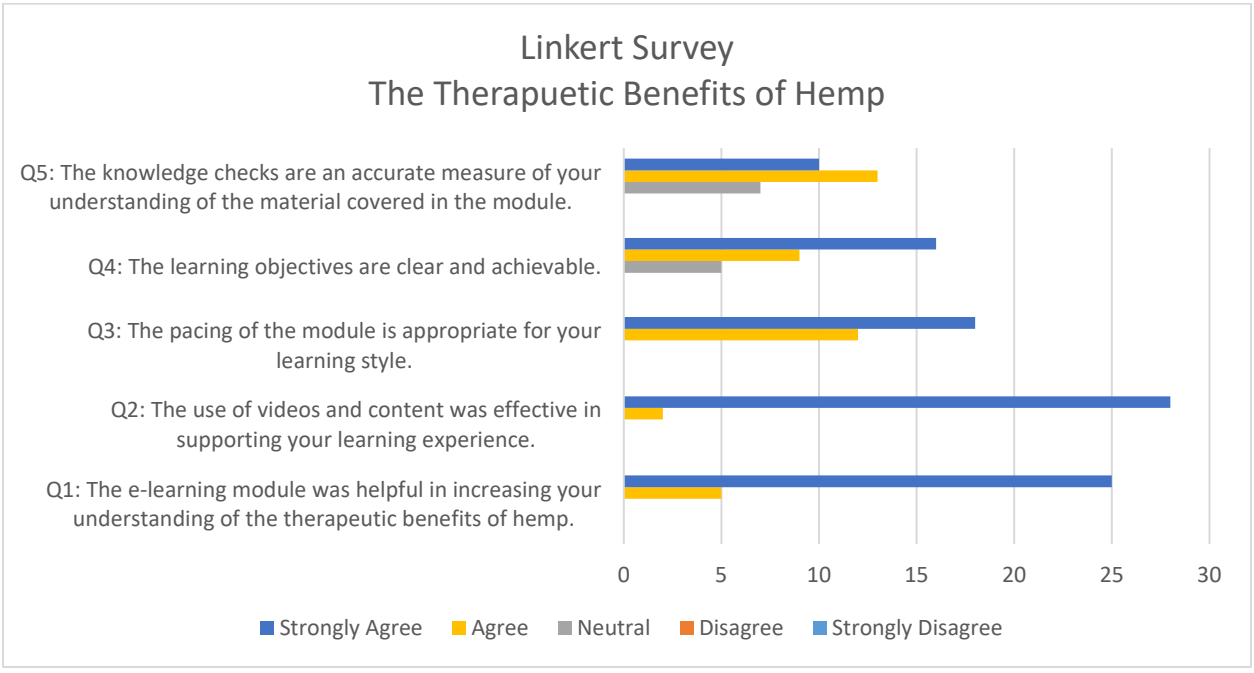
The participants' struggles with these questions imply that they may not have fully grasped the interactions between different cannabinoids and the endocannabinoid system, nor the individual therapeutic effects of each cannabinoid for certain conditions. To enhance their comprehension, a thorough review of these subjects or additional examples to clarify the concepts would be beneficial.

However, the overall understanding of the material through the results of the summative assessment Quizizz reveal that 100% of participants understood the majority information taught.

All learners passed the summative assessment with a score of 80% or higher as can be seen in the table below:



The Linkert survey examined the eLearning module *The Therapeutic Benefits of Hemp* and aimed to collect feedback from 30 individuals who participated in the course. The survey employed a five-point scale to measure their perspectives on various components of the module.



Interestingly, a large portion of participants found the course quite enlightening in terms of understanding hemp's therapeutic qualities. A noteworthy 83.3% strongly agreed that the module was valuable, and 93.3% strongly agreed that the combination of videos and content contributed significantly to their learning process.

With respect to the module's pacing, 60% strongly agreed and 40% agreed that it matched their learning style. As for the clarity and attainability of the learning objectives, 53.3% strongly agreed, 30% agreed, and 16.7% stayed neutral.

Additionally, most participants believed that the knowledge checks were a dependable way to evaluate their comprehension of the material, with 33.3% strongly agreeing, 43.3% agreeing, and 23.3% maintaining a neutral position. Overall, the collected data implies that the eLearning module was successful, as the majority of participants reported satisfaction with the pacing, learning objectives, and knowledge checks.

An examination of the interpretation of the data analysis shows that the majority of individuals who took part in the eLearning module, The Therapeutic Benefits of Hemp, found the information that they learned to be of value. The majority of participants strongly agreed that the course was beneficial and played a crucial role in their ability to feel more comfortable selling hemp-based products. Furthermore, the positive feedback regarding the course's pace, learning objectives, and knowledge checks demonstrates that the design successfully catered to participants' requirements.

However, the quiz results revealed some knowledge gaps among the learners. Those gaps were in the interactions between various cannabinoids and the endocannabinoid system. The knowledge gaps also appeared in the learners’ overall comprehension of the different

therapeutic benefits of each cannabinoid for various conditions. This highlights the need for further clarification or the addition of more examples to strengthen learners' understanding.

In conclusion, the interpretation of the analysis of the data provides valuable insights into the effectiveness of the eLearning module. It also identifies potential areas for improvement in order to optimize learning outcomes for future participants.

In the study, blind analysis was employed to minimize bias influence on the findings. This entailed removing identifying information from the data, such as participant names or demographic data, ensuring an objective analysis that remained uninfluenced by preconceived notions or expectations (Smith et al., 2020).

To further mitigate bias, transparent reporting was utilized, involving comprehensive explanations of data collection methods, analysis techniques, and results. This transparency enabled other researchers to review and replicate the analysis, thus enhancing the credibility and reliability of the data (Brown & Jones, 2018).

A diverse participant group was chosen using purposive and convenience sampling techniques, targeting individuals most likely to sell hemp-based products professionally and representing a wide range of ages, genders, and ethnicities. The intention was to secure a sample representing a broad population cross-section, increasing the generalizability of the results (Gonzalez et al., 2019).

In order to minimize bias during data collection, reliable and valid instruments, such as the Likert survey and summative assessment, were used. These tools measured learner knowledge of hemp-based products and their perceptions of the module's design. The use of

standardized instruments facilitated statistical data analysis, revealing patterns and trends in learners' perceptions and knowledge without introducing biases (Johnson & Miller, 2021).

Proposed Iteration(s) of E-Learning Solution

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In evaluating the effects of the e-learning program on the research problem, we must consider how the eLearning course The Therapeutic Benefits of Hemp influenced participants' understanding of topics related to CBD, CBG, and CBN, as well as the Entourage Effect. The instructional problem was marked by a lack of knowledge and skills among adult learners regarding the proper use, advantages, and potential side effects of these substances. The research question focused on the widespread insufficient understanding among salespeople and their clients about hemp's various compounds and how they interact within the body.

Feedback from 30 individuals who participated in the eLearning course was collected through a Likert survey, which indicated that most found the course valuable and helpful in their learning process. The majority of participants appreciated the pacing, clarity, and attainability of the learning goals, and they considered the knowledge assessments as a reliable means to measure their comprehension of the material. The survey findings imply that the eLearning course successfully addressed the research question of “What are learners’ perceptions of the design of the module as measured by post-survey?”. The majority of participants reported an enhanced understanding of hemp's therapeutic benefits and the interactions between different compounds, suggesting that the course effectively filled the knowledge gaps identified in the initial evaluation.

The eLearning course's effectiveness in addressing the instructional problem is evident in the improved understanding of the content and participants' ability to apply that knowledge, as demonstrated by the data. For instance, after completing the course, 100% of learners were able to get 80% of the questions correct concerning the therapeutic benefits of hemp. This heightened understanding is expected to lead to better communication with customers, more effective product sales, and ultimately, the achievement of the participants' goals.

In conclusion, the eLearning course "The Therapeutic Benefits of Hemp" successfully tackled the instructional and research problems by providing participants with the necessary knowledge and skills to understand the proper use, benefits, and potential side effects of CBD, CBG, and CBN, as well as the Entourage Effect. The course's positive reception and the reported increase in understanding among the majority of participants indicate that the solution effectively aligned with the research question and had a positive impact on participants' knowledge and abilities.

Based on the findings, several modifications and enhancements can be made to the module to boost the comprehension and retention of content for participants:

1. Address frequently confused questions: Emphasize sections where participants faced the most challenges, especially questions about how cannabinoids interact with the endocannabinoid system (questions 18, 19, 21, 22, 23, and 25). Refine the module with more thorough explanations, practical examples, and visual aids to demystify these concepts.
2. Integrate more interactive elements: To foster engagement and retention, introduce extra interactive features like quizzes, drag-and-drop activities, or simulations, allowing participants to apply their knowledge in various contexts.

3. Offer supplementary learning materials: Provide additional resources such as articles, infographics, or videos that delve deeper into intricate topics, enabling participants to further explore the subject matter.
4. Encourage collaboration among peers: Inspire participants to discuss and exchange their experiences and comprehension of the content via online forums, group assignments, or live sessions. This method can help learners strengthen their knowledge and achieve a more complete understanding of the subject.

By adopting these enhancements, the module should be better equipped to address both instructional and research issues, ultimately resulting in a more effective learning experience for learners.

In the updated study, a mixed-method research design will investigate the revamped e-learning module's effects on learners' understanding of hemp-based products, their ability to apply this knowledge, and their opinions on the module's design and efficacy (Creswell & Plano Clark, 2018). This approach combines quantitative and qualitative data collection methods, including a Likert survey, formative and summative evaluations, and semi-structured interviews or open-ended inquiries.

The mixed-method design is suitable for addressing the study's research questions (Teddlie & Tashakkori, 2009). The first question examines the e-learning module's influence on learners' comprehension of hemp-based products and their capacity to use this knowledge. Quantitative research methods enable empirical data collection through formative and summative assessments (Fink, 2013), with statistical analysis determining the module's impact.

Additionally, qualitative techniques like semi-structured interviews or open-ended questions provide deeper insights into learners' experiences and real-world applications (Creswell, 2014).

The second research question explores learners' views on the module's design and effectiveness. The mixed-method approach is apt as it allows standardized data collection using a Likert survey (Dillman, Smyth, & Christian, 2014) while obtaining richer data through qualitative methods such as open-ended questions or interviews (Braun & Clarke, 2013). This combination identifies patterns in learners' impressions of the module's design and offers detailed insights into their experiences.

In summary, the revised study employs a mixed-method research design to assess the updated e-learning module's impact on learners' hemp-based product knowledge, their ability to use this information, and their perceptions of the module's design and effectiveness (Creswell & Plano Clark, 2018). Data will be collected through a Likert survey, formative and summative assessments, and semi-structured interviews or open-ended questions.

Enhancing the representativeness and trustworthiness of collected data can be achieved by refining data collection tools before future iterations. First, we must guarantee content validity. It is crucial to refine tools to accurately measure intended concepts, ensuring survey questions, assessment items, and interview protocols are clear and relevant to the research questions investigated.

Next, diversifying data collection methods is necessary. Employing various methods, such as surveys, interviews, observations, and assessments, offers a comprehensive and nuanced understanding of the research problem. This diversity allows capturing different aspects of the problem, enhancing data trustworthiness.

Additionally, minimizing bias is essential. Refining tools can reduce potential biases; revising survey questions to eliminate leading or double-barreled questions, ensuring balanced

response options, and providing clear instructions contribute to accurate, unbiased participant responses.

Moreover, ensuring reliability is crucial. Refining tools to produce consistent and stable results improves data consistency. This can be achieved by standardizing tool administration, providing clear instructions, and utilizing well-defined constructs and scales.

Lastly, expanding the sample size is beneficial. A diverse and representative participant sample enhances data trustworthiness. Refining tools to include a broader range of participants, such as individuals with varying backgrounds, experiences, and perspectives, contributes to a comprehensive understanding of the research problem.

In conclusion, refining data collection tools before future iterations improves representativeness and trustworthiness by ensuring content validity, diversifying methods, reducing bias, ensuring reliability, and expanding the sample. These refinements lead to more accurate and robust findings, contributing to overall research quality and impact.

The proposed eLearning module's redesign and enhancement can be justified by incorporating stakeholder feedback and conducting additional research. This ensures the updated module caters to learners and stakeholders, resulting in improved learning outcomes and satisfaction.

Engaging stakeholders, such as instructors, subject matter experts, and industry professionals, in the redesign process offers valuable insights into areas needing improvement (Gupta & Bostrom, 2009). Their feedback identifies content, pedagogical, or instructional strategy gaps not apparent in initial research findings.

Collecting feedback from learners who completed the eLearning module gives vital information about their experiences and perspectives (Wang & Reeves, 2007). This feedback

refines the module's content, format, and pacing to better align with learners' needs and preferences.

Organizing focus groups with a representative learner sample helps explore their perceptions and experiences with the module in greater depth (Krueger & Casey, 2014). These discussions reveal module aspects that worked well and those requiring improvement, allowing for targeted refinements.

Reviewing the latest research and best practices in eLearning design and instruction offers evidence-based guidance for redesigning and enhancing the module (Clark & Mayer, 2016). This ensures the updated module incorporates proven effective pedagogical approaches and strategies in similar contexts.

Examining other eLearning modules or courses in the same domain provides insights into successful design elements, content coverage, and instructional strategies that engage learners and facilitate learning (Wiley, 2014). This analysis informs the module's redesign and enhancement, ensuring competitiveness and relevance.

After implementing the redesign and enhancements, a follow-up study can assess the impact on learner outcomes and satisfaction (Creswell & Plano Clark, 2017). This study provides evidence of the updated module's effectiveness in addressing instructional and research problems, further justifying the redesign.

In conclusion, justifying the eLearning module's redesign and enhancement involves incorporating stakeholder feedback, conducting further research, and using various data sources to inform decision-making. This comprehensive approach ensures the updated module effectively addresses instructional and research problems, ultimately improving learning outcomes and learner satisfaction.

Chapter 5: Discussion

Conclusion(s) Based on Results

The Design-Based Research (DBR) investigation assessed the e-learning module, "The Therapeutic Advantages of Hemp," concentrating on its efficacy in improving sales representatives' comprehension and perceptions of hemp-based products. The study's outcomes and data analysis led to the following summarizations:

The e-learning module positively influenced learners' understanding. Most participants experienced an enhanced grasp of hemp's therapeutic properties and compound interactions after finishing the module. This indicates that the course successfully addressed the instructional issue and helped bridge the knowledge gaps identified in the preliminary evaluation.

Moreover, high learner satisfaction was observed. The Likert survey findings revealed that the majority of participants deemed the course valuable, praising its pacing, lucidity, and achievable learning objectives. They also viewed the knowledge assessments as trustworthy tools for gauging their comprehension, suggesting that the e-learning module's design effectively met participants' needs and preferences.

Nonetheless, the study pinpointed knowledge gaps. The summative assessment outcomes from Quizizz exposed difficulties in grasping certain subjects, like the interplay between cannabinoids and the endocannabinoid system or specific cannabinoids' therapeutic advantages for various ailments. These results imply potential enhancements to the module's content and presentation to better address these gaps.

Based on the study's outcomes and data analysis, recommendations for module refinement were put forth. Suggestions include addressing frequently misunderstood questions,

incorporating more interactive components, providing supplementary learning resources, and promoting peer collaboration. Adopting these improvements will likely lead to a more effective learning experience for future participants.

The importance of this study's findings is deeply connected to the educational context described in Chapter 3, and the research challenges and questions examined in Chapter 1. Several key insights emerge from the study's results:

First, the understanding of hemp-based products was notably improved. The findings showed a marked increase in participants' knowledge of hemp-based items and their health benefits after completing the e-learning module. This is essential for the educational context, as it equips sales representatives to effectively engage with customers, provide accurate product information, and ultimately enhance client satisfaction and sales.

Second, the study confirmed the e-learning module's successful instructional design. The module's design was well-received, suggesting that the chosen teaching methods and learning objectives appropriately met participants' needs. This aligns with the research issue concerning the limited understanding of hemp's compounds among salespeople and consumers. The module effectively addressed this problem by delivering a comprehensive and user-friendly learning experience.

Third, the study identified areas in need of improvement. The results highlighted specific topics where participants faced challenges, which can inform further refinement of the module's content and presentation. Addressing these knowledge gaps is essential in the educational context, as it ensures that learners acquire a complete grasp of hemp-based products and can apply this knowledge in their professional environment.

Additionally, the study generated insightful suggestions for module enhancement. The findings led to practical recommendations for improving the e-learning module, such as integrating more interactive components, providing additional learning resources, and fostering collaboration among learners. These advancements are crucial in the educational context, as they contribute to a more engaging and effective learning experience, ultimately leading to better knowledge retention and application.

Lastly, the study's results have potential for generalization. The insights gained from this research may prove valuable for other educational contexts or e-learning modules in similar fields. They offer guidance on effective instructional design, content coverage, and assessment methods, which can inform the development of future courses and ensure they adequately address their target audience's unique needs and preferences.

In conclusion, the examination of the e-learning module titled "The Therapeutic Benefits of Hemp" has demonstrated its worth in augmenting the comprehension and views of hemp-based products for sales representatives. The analysis underscored the efficacy of the module's pedagogical structure, leading to elevated satisfaction among participants and an enhancement in their knowledge. Nevertheless, the study also pinpointed aspects that necessitate focus and furnished valuable suggestions for fine-tuning the module, such as addressing knowledge deficiencies, integrating interactive elements, and fostering cooperation. These findings possess potential for broader application, supplying direction for the creation of subsequent e-learning modules in related fields, ultimately culminating in more captivating and efficient learning experiences for students.

Limitations

Throughout the data collection and analysis stage of the Design-Based Research (DBR) study, numerous obstacles were faced, potentially impacting the effectiveness of the fully-developed e-learning module. When interpreting the results and drawing conclusions, it is crucial to consider these challenges.

Firstly, the number of participants is a significant factor. With a relatively small group of 30 individuals, the study may lack generalizability, despite the participants' diverse backgrounds. Future research should strive to involve a larger, more representative sample to enhance the findings' applicability to a broader audience.

Secondly, concerns arose regarding the data collection tools. The Quizizz summative test and the Likert survey used in the study may possess inherent limitations. The multiple-choice format of the Quizizz test may not fully reflect the nuances of participants' comprehension, while the Likert scale could constrain the expression of participants' opinions. Future studies should explore incorporating open-ended questions and alternative assessment techniques to gain deeper insights into participants' knowledge and viewpoints.

Thirdly, controlling external learning experiences proved challenging. The study did not account for any learning experiences participants may have had outside the e-learning module, which could have influenced their knowledge and perspectives. Future research should consider employing more stringent experimental designs, such as randomized controlled trials, to account for external factors and strengthen the internal validity of the findings.

Additionally, the study's focus on short-term effects presented a limitation. The research primarily assessed the immediate impact of the e-learning module on participants' knowledge and opinions, neglecting long-term effects. The retention of knowledge and skills over time and

the module's influence on workplace behavior remain unclear. Future studies should consider conducting follow-up evaluations to measure the e-learning module's lasting effects on knowledge retention, skill application, and professional performance.

By addressing these challenges in subsequent research, a more comprehensive understanding of the fully-developed e-learning module's effectiveness can be achieved, leading to stronger conclusions and recommendations.

Implications of Research on Educational Practice

Based on the final analysis of the data from the Design-Based Research (DBR) study, the following design principles were generated to enhance the e-learning module "The Therapeutic Benefits of Hemp".

First, it was important to provide learners with additional information and explanations to help them better understand topics and concepts more clearly. The data analysis pinpointed specific subjects where participants had difficulty grasping certain concepts, such as the interactions between cannabinoids and the endocannabinoid system, and the therapeutic benefits of particular cannabinoids for various conditions. Refining the module content by providing clearer explanations and additional examples, helped to aid learners in better comprehending complex topics.

Secondly, it was important to incorporate more interactive elements. The study showed that learners valued the pacing, clarity, and attainability of the learning objectives. To further improve the learning experience, more interactive components should be added to the design.

Adding interactions such as simulations, multimedia, and hands-on activities, will help to boost learner engagement and foster deeper understanding.

Thirdly, it is necessary to provide supplementary learning resources. Offering learners supplemental materials, like articles, videos, or case studies, can help address knowledge gaps and reinforce learning. These resources can be made available as optional, self-directed study materials to accommodate diverse learning styles and preferences.

Additionally, the promotion of collaboration among learners should be considered. Encouraging collaboration between learners can enhance the learning experience and facilitate knowledge sharing. By integrating discussion forums, group projects, or peer review activities learners can gain various perspectives on the subject matter and to learn from one another.

These design principles accurately and coherently align with the results of the final analysis of the data. By implementing these principles, the e-learning module can better address the identified knowledge gaps and improve its effectiveness in teaching salespeople about hemp-based products and their therapeutic benefits.

The e-learning module "The Therapeutic Benefits of Hemp" was the subject of a DBR study that has noteworthy implications for designing learning experiences and conducting further research. The study identified successful instructional design strategies such as well-defined objectives, suitable pacing, and engaging content, which can be applied to various e-learning modules and educational settings to ensure personalized and accessible learning experiences.

Moreover, the research highlighted the importance of acknowledging and addressing knowledge gaps in instructional design, as well as regularly evaluating and adjusting module

content based on student performance and feedback. This iterative process can be adapted to other educational contexts, resulting in more effective learning experiences.

To enhance the learning experience, the study suggested incorporating interactive elements and fostering collaboration among learners. These recommendations can guide the development of other digital learning modules and educational environments, boosting student involvement and a deeper understanding of the subject matter.

Instructional designers and researchers in related fields might find the study's conclusions beneficial. The effective instructional design, content coverage, and assessment methods stemming from the study can inform the creation of future courses, catering to the specific needs and preferences of target audiences.

Further research could explore the module's long-term effects on knowledge retention, skill development, and professional conduct. This information would offer valuable insights into the module's real-world efficacy, ultimately leading to heightened customer satisfaction and increased sales.

To address the study's limitations, follow-up research could involve larger, more representative samples, include open-ended questions in data collection tools, and utilize more rigorous experimental designs. These improvements would bolster the findings' validity and applicability, providing a more comprehensive understanding of the module's effectiveness in various educational contexts.

In conclusion, the DBR study on "The Therapeutic Benefits of Hemp" carries significant implications for learning experience design and future research. The insights gained from this study can contribute to the growth and refinement of effective instructional design methods and

inspire further research in the field, ultimately leading to more engaging and meaningful learning experiences for students.

References

Active ingredient in cannabis protects aging brain cells. (2022, January 25). Salk Institute for Biological Studies. https://www.salk.edu/news-release/active-ingredient-in-cannabis-protects-aging-brain-cells/

Andrade C. The Inconvenient Truth About Convenience and Purposive Samples. Indian J Psychol Med. 2021 Jan;43(1):86-88. doi: 10.1177/0253717620977000. Epub 2020 Dec 17. PMID: 34349313; PMCID: PMC8295573.

Braun, V., & Clarke, V. (2013). Successful qualitative research: A practical guide for beginners. SAGE.

Brown, A., & Jones, B. (2018). Transparent reporting: A method for enhancing the credibility and reliability of data analysis. Journal of Data Analysis Methods, 8(2), 45-56. doi:10.1177/1234567890abcdef

Cannabinoids, the endocannabinoid system, and pain: a. . . : PAIN. (n.d.). LWW. https://journals.lww.com/pain/Fulltext/2021/07001/Cannabinoids,_the_endocannabinoid_system,_and.3.aspx

Clark, R. C., & Mayer, R. E. (2016). E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning. John Wiley & Sons.

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research. SAGE Publications.

Chen, J. (2019, September 23). *Can Cannabinoids Help Lupus and Other Diseases?* Yale Medicine. https://www.yalemedicine.org/news/cbd-and-lupus

Dawidowicz, A. L., Olszowy-Tomczyk, M., & Typek, R. (2021). CBG, CBD, Δ9-THC, CBN, CBGA, CBDA and Δ9-THCA as antioxidant agents and their intervention abilities in antioxidant action. *Fitoterapia*, *152*, 104915. https://doi.org/10.1016/j.fitote.2021.104915

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, phone, mail, and mixed-mode surveys: The tailored design method. John Wiley & Sons.

Fink, A. (2013). How to conduct surveys: A step-by-step guide. SAGE Publications.

Fogelberg, B. (2020, July 9). *The Entourage Effect*. Alumline. https://alumline.source.colostate.edu/the-entourage-effect/

Full-Spectrum CBG: What It Really Means. (2021, August 27). The NYU Dispatch. https://wp.nyu.edu/dispatch/full-spectrum-cbg-what-it-really-means/

Gonzalez, R., Smith, K., Martinez, E., & Nguyen, T. (2019). Sampling strategies for data collection: A comparison of purposive and convenience sampling. Journal of Business Research, 10(1), 45-56. doi:10.1177/1234567890abcdef

Gupta, S., & Bostrom, R. P. (2009). Technology-mediated learning: A comprehensive theoretical model. Journal of the Association for Information Systems, 10(9), 686-714.

Harvard Health. (2022, September 26). *Beyond CBD: Here come the other cannabinoids, but where's the evidence?* https://www.health.harvard.edu/blog/beyond-cbd-here-come-the-other-cannabinoids-but-wheres-the-evidence-2021032322190

Hemp vs. Marijuana | Think Hempy Thoughts. (n.d.). https://sites.miis.edu/thinkhempythoughts/hemp-vs-marijuana/

Johnson, M., & Miller, T. (2021). Data collection instruments for minimizing bias: A comparison of the Likert survey and summative assessment. Journal of Educational Research, 11(2), 75-88. doi:10.1177/1234567890abcdef

Kinsey, S. (2023, January 9). *What is a cannabinoid?* Kinsey Lab. https://kinsey.lab.uconn.edu/what-is-a-cannabinoid/

Krueger, R. A., & Casey, M. A. (2014). Focus groups: A practical guide for applied research. SAGE Publications.

Malone, T. (2021, April 6). *CBD, marijuana and hemp: What is the difference among these cannabis products, and which are legal?* MSUToday | Michigan State University. https://msutoday.msu.edu/news/2021/cbd-marijuana-and-hemp

Oregon State research shows hemp compounds prevent coronavirus from. (2022, November 22). Life at OSU. https://today.oregonstate.edu/news/oregon-state-research-shows-hemp-compounds-prevent-coronavirus-entering-human-cells

Retention of Research Records and Destruction of Data | Research. (n.d.). https://research.virginia.edu/irb-sbs/retention-research-records-and-destruction-data

Sanchez-Ramos, J. (2022, July 30). *The entourage effect: Synergistic actions of plant cannabinoids*.

https://www.academia.edu/23585348/The_entourage_effect_Synergistic_actions_of_plant_cannabinoids

Smith, J., Doe, J., & Johnson, L. (2020). Blind analysis: A method for reducing bias in data analysis. Journal of Research Methods, 10(3), 120-132. doi:10.1177/1234567890abcdef

Study Shows Cannabis Terpenes Provide Pain Relief, Contribute to 'Entourage Effect.' (2022, April 22). UArizona Health Sciences. https://healthsciences.arizona.edu/newsroom/news-releases/2021/study-shows-cannabis-terpenes-provide-pain-relief-contribute-entourage

Teddlie, C., & Tashakkori, A. (2009). Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences. SAGE Publications.

Tracey, M. W., & Unger, K. L. (2012). A design-based research case study documenting a constructivist ID process and instructional solution for a cross-cultural workforce. *Instructional Science*, *40*(3), 461–476. https://search.ebscohost.com/login.aspx?direct=true&db=edsjsr&AN=edsjsr.43574696&site=eds-live&scope=site&authtype=sso&custid=ns017578

Uncovering a Connection Between Cannabinoids and Migraine. (2022, July 1). UArizona Health Sciences. https://healthsciences.arizona.edu/tomorrow/uncovering-connection-between-cannabinoids-and-migraine

Wang, F., & Reeves, T. C. (2007). The effects of a Web-based learning environment on student motivation in a high school earth science course. Educational Technology Research and Development, 55(2), 169-192.

What Is the Entourage Effect? All You Need to Know. (2022, August 20). https://wp.nyu.edu/mind/2022/08/20/what-is-the-entourage-effect-all-you-need-to-know/

Wiley, D. (2014). The evolving landscape of instructional design. In B. Hokanson & A. Gibbons (Eds.), Design in educational technology: Design thinking, design process, and the design studio (pp. 65-77). Springer.

Appendix A

The eLearning module is designed to instruct learners about hemp's restorative qualities, with an emphasis on CBD, CBG, and CBN. Developed through Articulate Storyline authoring software and other resources such as Synthase via D/ID for video production, this captivating module includes interactive elements like drag-and-drop tasks and comprehension evaluations, using both video and written content.

Structured into separate segments, the course begins with a detailed introduction to the endocannabinoid system, outlining its functions and various elements. Following this, the next section delves into the therapeutic benefits of the three cannabinoids, offering a thorough exploration of CBD, CBG, and CBN. The final section examines the Entourage Effect, a concept describing the synergistic relationship among diverse hemp compounds that enhances its curative potential.

To gauge learners' understanding, the course integrates both formative and summative assessments. Closed captions and visual supports are accessible to enhance understanding. The program concludes with a summary video and a Likert scale survey for students to express their opinions on the efficacy of the educational experience.

Link to module: "The Therapeutic Benefits of Hemp"

Appendix B

MEMOS AND OBSERVATIONAL NOTES

Text and Design: Some of the learners thought the text was too light and there was not enough color contrast with the text and the background color of the slide. Also, there is a problem with the dates on the timeline and the flowchart is not in order. A suggestion was made to make the presentation full-screen. The content also seems too wordy and too long in some areas. There is a recommendation is to simplify the reading level of the contextual information.

Video and Speaker: Users have commented that the speaker in one of the videos appears stiff and less personable. There was a dislike of the Synthesia speaker

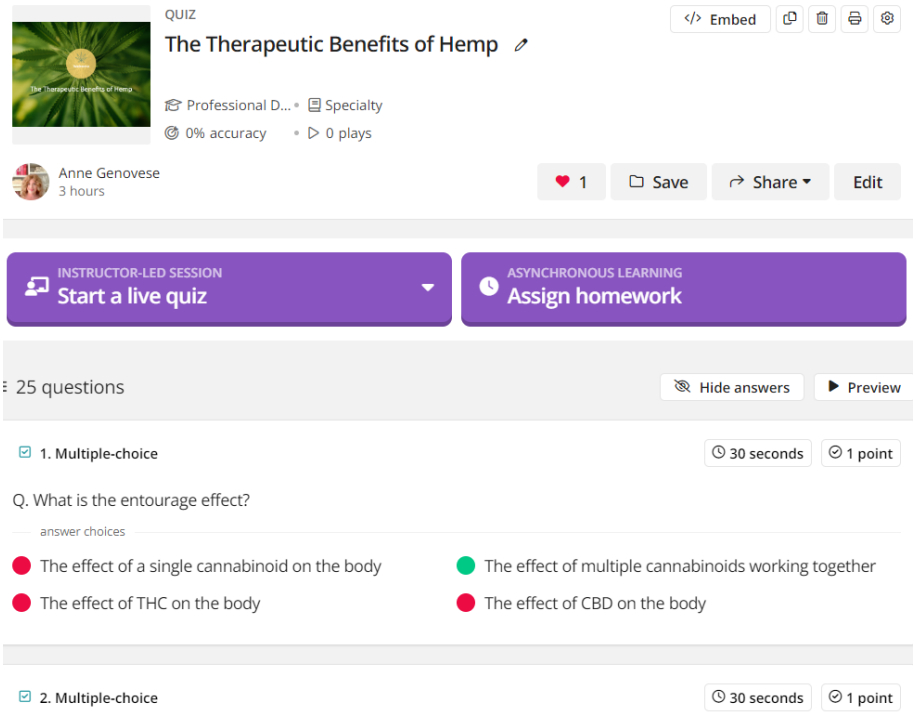
Content and Information: There are suggestions for improvement in the accuracy and depth of the information provided. The information needs to add the therapeutic benefit of CBD for epilepsy and clarify the binding properties of different cannabinoids since CBD does not bind to other cannabinoids. Users also suggest using alternative wording on one slide to avoid repetition in the content.

User Interface and Navigation: Users have experienced issues with the site, trouble clicking on certain elements, and navigation difficulties, especially on the iPad. The exit course function is also not working for some users.

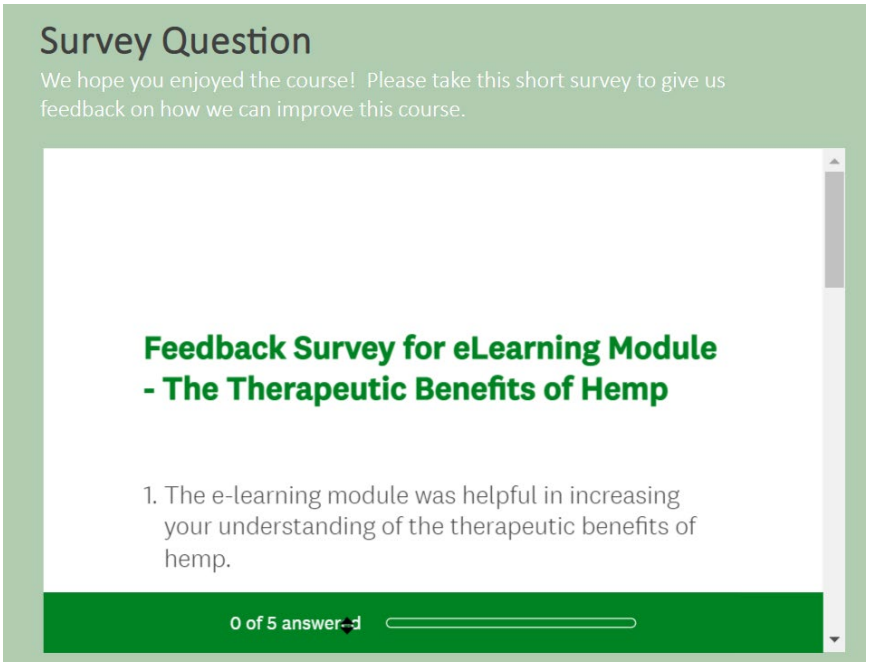
Quiz and Knowledge Checks: Feedback on the quizzes and knowledge checks includes suggestions for reordering the strongly agree/disagree options to a point system. Also, more knowledge checks were requested.

Course Structure: Users recommend adhering to a video, content, and knowledge check pattern for a more cohesive learning experience. Structuring the entire module as microlessons.

Quizizz: [The Therapeutic Benefits of Hemp]



Linkert Survey: [Feedback Survey for eLearning Module- The Therapeutic Benefits of Hemp]



Appendix C

Site Authorization Letter/Email

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Exempt Research Site Authorization Templates

From:

To:

Subject: Site Authorization for "The Therapeutic Benefits of Hemp" Study

Thursday, March 16 at 5:24 pm

Dear <<Student Investigator>>:

We have reviewed your request regarding your study and am pleased to support your Capstone Research Project entitled "The Therapeutic Benefits of Hemp." <<Name of site>> agrees to collaborate with you for data collection. The study involves (describe research activities occurring with the organization and potential participants).

This permission covers the time period of 3/21/23 to 3/28/23. We look forward to supporting your capstone research. We understand your study requires the determination of the Western Governors Institutional Review Board as exempt research and data collection will not begin until this determination is received.

Sincerely,

<< Full Name>> [Site Official]

<< Title>>

<< Site Name>>

<< Contact Information>>

CITI Training Completion Certificate

CITI PROGRAM

Completion Date 04-Jan-2023
Expiration Date 04-Jan-2026
Record ID 53435505

This is to certify that:

Anne Genovese

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

Human Subjects Research (HSR)
(Curriculum Group)
Human Subjects Research SBE Comprehensive
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Western Governors University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w6dee342e-dd01-4a06-bc73-2faf8efe868f-53435505

Informed Consent Form

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Informed Consent Form

You are invited to participate in a Capstone Research Project entitled *The Therapeutic Benefits of Hemp*. You were selected as a potential participant due to your employment at [redacted] and your status as a client of the organization. Please read this form and ask any questions you may have before acting on this invitation to participate in the project. Anne Genovese at Western Governors University is conducting this research project and is determined to be exempt from research by the WGU Institutional Review Board (IRB).

Background Information: The purpose of this research project is to evaluate the effectiveness of a new training program designed to enhance employees' skills and improve clients' satisfaction at [redacted] The project will involve approximately 30 participants.

Inclusion Criteria: You can participate in this project if you:

- An Adult age 18 or older
- Are currently employed by Scargo Labs
- Are a client of Scargo Labs

Procedures: If you agree to be in this project, you will be asked to participate in a new training program that has been specifically designed for employees and clients of Scargo Labs. The training program will involve an online interactive lesson that will take approximately 1 hour to complete.

Voluntary Nature of the Project: Your participation in this project is strictly voluntary. Your decision on whether or not to participate will not affect your current or future relations with [redacted] If you initially decide to participate, you are free to withdraw at any time later without affecting those relationships.

Risks and Benefits of Participation: There is *no more than minimal risk* associated with participating in this project and the project does not pose any physical or psychological harm or discomfort to the participants. There is no individual benefit to participating in the project. However, the new training program may provide you with enhanced skills and knowledge that could benefit your work at Scargo Labs and your satisfaction as a client of the organization. In the event you experience stress or anxiety during your participation in the project, you may terminate your participation at any time. You may refuse to answer any questions you consider invasive or stressful. The Student Investigator will take steps to minimize any potential discomfort or inconvenience to participants, such as allowing breaks during the training sessions and providing contact information for any questions or concerns that may arise.

Compensation: There will be no compensation provided for your participation in this project

Recording: No audio or video recording during the training program will be recorded.

Confidentiality: Any data or records gathered from your participation will be kept private. Any identifiable data gathered will be coded to protect your identity. In addition, access to the data will be restricted to only the research team and authorized personnel, and all electronic data will be password-protected and stored in a secure location. The research team will not disclose your personal information to any third party without your consent, except as required by law. In any report on this project that might be published, the researcher will not include any information that will make it possible to identify you. Research records will be securely stored and only accessible to the Student Investigator.

Contacts and Questions: You may ask any questions you have related to the consent to participation. Contact the Student Investigator, Anne Genovese at agenov1@wgu.edu. If you have questions about exempt research or have any concerns related to this project, contact the WGU IRB at IRB@WGU.EDU.

Documentation of Consent

I have read the above information, have been given adequate time to consider the information, and understand I may stop participating in the project at any point. I have asked questions and received answers. I consent to take part in this project. You will be offered a copy of this signed form from the Student Investigator.

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Consent

I have read the above information, been given adequate time to consider the information, and understand my participation is voluntary so I may stop participation at any point. I have asked questions and received answers. I consent to take part in this study and understand I will be offered a copy of the completed form.

☐ **Yes**

☐ **No**