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The Effects of Audiovisual Resources in Virtual classroom in E-Learning Context: Case Study

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A B S T R A C T

This research paper investigates the impact of audiovisual elements in e-learning environments, focusing on a case study that analyses their effectiveness in enhancing learner engagement and knowledge retention. As digital education continues to evolve, understanding how audiovisual media influences learning outcomes is crucial for educators and instructional designers. The study employs a mixed-methods approach, combining quantitative data from learner assessments and qualitative feedback through interviews. Results indicate that the integration of audiovisual materials—such as videos, animations, and interactive simulations—significantly improves learners' motivation and comprehension compared to traditional text-based methods. Furthermore, the paper discusses the implications of these findings for the design of e-learning curricula, emphasizing the need for a balanced use of audiovisual resources to cater to diverse learning styles. This research contributes to the growing body of literature on e-learning by providing empirical evidence of the benefits of audiovisual effects, ultimately guiding future developments in online education strategies.

Keywords: E-learning, Audiovisual Effects, Virtual Classrooms, Learner Understanding, Learner Engagement.

تأثيرات الموارد السمعية والبصرية في الفصول الدراسية الافتراضية في سياق التعلم الإلكتروني دراسة حالة

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الملخص

يتناول هذا البحث تأثير العناصر السمعية والبصرية في بيئات التعلم الإلكتروني، مع التركيز على دراسة حالة تحلل مدى فعاليتها في تعزيز مشاركة المتعلم والاحتفاظ بالمعرفة. ومع استمرار تطور التعليم الرقمي، فإن فهم كيفية تأثير الوسائط السمعية والبصرية على نتائج التعلم أمر بالغ الأهمية للمعلمين ومصممي التعليم. تستخدم الدراسة نهجًا مختلط الأساليب، يجمع بين البيانات الكمية من تقييمات المتعلمين والملاحظات النوعية من خلال المقابلات. تشير النتائج إلى أن دمج المواد السمعية والبصرية – مثل مقاطع الفيديو والرسوم المتحركة والمحاكاة التفاعلية – يحسن بشكل كبير من دافعية المتعلمين وفهمهم مقارنة بالطرق التقليدية القائمة على النص. علاوة على ذلك، يناقش البحث آثار هذه النتائج على تصميم مناهج التعلم الإلكتروني، مع التأكيد على الحاجة إلى الاستخدام المتوازن للموارد السمعية والبصرية لتلبية أنماط التعلم المتنوعة. يساهم هذا البحث في مجموعة متزايدة من الأدبيات حول التعلم الإلكتروني من خلال تقديم أدلة تجريبية على فوائد التأثيرات

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E-mail als.ahmed@wau.edu.ly10 December2024 - Received in revised form5 Januare2025
Accepted 28 februare 2025

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السمعية والبصرية، مما يوجه التطورات المستقبلية في استراتيجيات التعليم عبر الإنترنت.

الكلمات المفتاحية: التعلم الإلكتروني، المؤثرات السمعية والبصرية، الفصول الدراسية الافتراضية، فهم المتعلم، مشاركة المتعلم.

Introduction

The rapid advancement of technology has transformed traditional educational paradigms, leading to the emergence of e-learning as a prominent mode of instruction. Electronic-education involves several digital formats, including e-courses, virtual classrooms, and multimedia resources, which enable learning anytime and anywhere [1]. As educators strive to enhance the effectiveness of online learning, the incorporation of audiovisual elements has gained attention. Audiovisual materials—such as videos, animations, and interactive simulations—are believed to enrich the learning experience by catering to diverse learning preferences and improving engagement [2].

Research suggests that audiovisual aids can significantly impact learners' understanding and retention of information. For instance, studies have shown that learners exposed to multimedia presentations perform better on assessments compared to those who engage with text-only materials [3]. The dual coding theory posits that information processed through both visual and auditory channels enhances memory retention [4]. Consequently, integrating audiovisual effects into e-learning environments may offer substantial benefits in terms of learner motivation and achievement.

Despite the promising potential of audiovisual elements in e-learning, there remains a need for empirical studies that explore their specific effects within diverse educational contexts. This paper presents a case study that examines the role of audiovisual resources in an e-learning setting, focusing on their impact on learner engagement and knowledge retention. By analyzing both quantitative and qualitative data, this research aims to provide insights into effective instructional design strategies that leverage audiovisual media.

Literature Review

The integration of audiovisual elements in e-learning has garnered significant attention in recent years, highlighting their role in enhancing learner engagement, retention, and overall educational effectiveness. As digital education continues to evolve, understanding the impact of multimedia on learning outcomes becomes increasingly important.

The positive impacts of audiovisual resources in e-learning is stranded in numerous theoretical frameworks. Mayer's Cognitive Theory of Multimedia Learning posits that individuals learn more effectively from words and images than from words alone. This theory emphasizes the dual-channel processing of information, suggesting that multimedia aids can enhance cognitive engagement [2]. Furthermore, Mayer 2014, expanded this theory by introducing principles for effective multimedia design, including coherence, signaling, and redundancy, which are crucial for optimizing learning experiences [5].

Paivio's Dual Coding Theory supports the notion that information presented in both verbal and visual formats can enhance memory retention [4]. Recent studies have confirmed that learners who engage with multimedia content demonstrate improved recall and application of knowledge [3].

Recent empirical studies have provided substantial evidence regarding the benefits of audiovisual elements in e-learning. A meta-analysis by Hattie 2009, found that multimedia instruction significantly enhances student performance across various disciplines [6]. Additionally, research by Zhang et al. 2020, demonstrated that students exposed to multimedia

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resources exhibited higher levels of engagement and satisfaction compared to those using traditional text-based materials [7].

The use of interactive audiovisual materials, such as animations and gamified content, has also been linked to increased motivation and deeper learning. For instance, Hamari et al. 2016, found that gamification strategies in e-learning platforms led to heightened student engagement and improved learning outcomes [8]. This is further supported by findings from Wouters et al. 2013, which indicate that simulation-based learning fosters critical thinking and problem-solving skills [9].

Audiovisual materials can be classified into several categories based on their characteristics and educational purposes. One common classification is based on the type of content, which includes video, audio, animations, and interactive simulations. Mayer, 2020, agreed that videos can range from recorded lectures to instructional videos that demonstrate processes or concepts [10]. Audio materials, such as podcasts and audiobooks, provide an alternative means of delivering information, often enhancing accessibility for auditory learners [11]. Animations and simulations are particularly effective in illustrating complex ideas and processes, allowing learners to visualize concepts that may be difficult to grasp through text alone [12]. Additionally, interactive materials, which engage users through quizzes or interactive scenarios, promote active learning and can significantly enhance retention [13]. This classification not only aids educators in selecting appropriate materials for their courses but also helps learners understand the diverse formats available to support their learning needs.

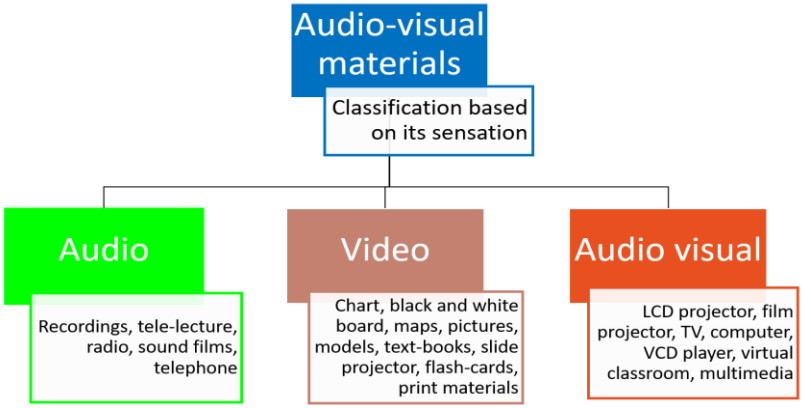

Fig 1: Audiovisual Material Classification

Despite the advantages of integrating audiovisual elements, challenges persist. Chen et al. 2019, highlight the risk of cognitive overload when learners are inundated with excessive multimedia content [14]. Instructional designers must balance engaging audiovisual materials with cognitive load to optimize learning outcomes.

Moreover, the effectiveness of audiovisual resources may vary based on individual learning preferences. Dunn and Dunn 2018, emphasize the importance of tailoring instructional materials to accommodate diverse learner needs [15]. This suggests that while audiovisual elements can enhance learning, their design and implementation must consider the characteristics of the target audience.

In light of the COVID-19 pandemic, there has been a surge in online learning, prompting new research on the effectiveness of audiovisual elements in virtual environments [16]. A study by Alharbi et al. 2021, found that incorporating video lectures significantly improved student

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engagement and performance in online courses [17]. Similarly, a systematic review by Khalil and Elkhider 2020, highlighted the positive impact of multimedia resources on student satisfaction and learning outcomes in remote education settings [18].

The literature indicates a strong correlation between the use of audiovisual elements in e-learning and improved learner engagement, understanding and retention. However, careful consideration of cognitive load and individual learning preferences is necessary to maximize the benefits of multimedia instruction [19]. This research paper aims to contribute to this field by presenting a case study that examines the specific effects of audiovisual resources in an e-learning context.

Research Problem

The rapid advancement of technology has transformed traditional educational paradigms, leading to the widespread adoption of e-learning platforms. While these platforms offer flexibility and accessibility, the effectiveness of e-learning is significantly influenced by various factors, particularly audiovisual elements [20].

Despite the growing prevalence of e-learning, there is a lack of comprehensive understanding regarding the impact of audiovisual effects on learner engagement, retention, and overall academic performance [21]. Many e-learning courses fail to effectively incorporate multimedia elements, which can lead to diminished learning outcomes.

1. Engagement Levels: Studies indicate that audiovisual content can enhance learner engagement [21]. However, there is insufficient research on which specific audiovisual elements (e.g., videos, animations, sound effects) most effectively capture and maintain student interest.
2. Diverse Learning Styles: Learners have varied preferences and styles, which can influence how they interact with audiovisual content. Understanding these differences is crucial for designing effective e-learning experiences.
3. Assessment of Effectiveness: There is a need for robust methodologies to evaluate the impact of audiovisual effects on learning outcomes. Current assessment tools may not adequately capture the nuances of multimedia learning environments.
4. Retention: The integration of multimedia in e-learning can either facilitate or hinder the learning process. An overload of audiovisual stimuli may lead to cognitive overload, negatively affecting comprehension and retention.

This study aims to investigate the relationship between audiovisual effects and learner engagement in e-learning environments. In addition, Analyze the impact of audiovisual content on cognitive load and retention. Moreover, examine how diverse learning styles influence the effectiveness of audiovisual elements in e-learning.

Understanding the role of audiovisual effects in e-learning is essential for educators, instructional designers, and policymakers. This research will contribute to the development of more effective e-learning strategies that enhance engagement and improve learning outcomes, ultimately leading to a more effective educational experience. By addressing the outlined challenges, this study seeks to provide valuable insights into the interplay between audiovisual elements and e-learning effectiveness.

Research Methods

The descriptive analytical approach will be the methodology adopted in this research, as it is a method that facilitates a comprehensive and extensive analysis of the research problem. This approach allows for a deep understanding of the various dimensions of the issue at hand and provides a structured framework for examining the complexities involved.

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- Research Divisions

The research will be organized into several key sections:

1. Studying Previous Experiences: This section will focus on analysing past implementations of e-learning, drawing lessons from successes and challenges encountered in other contexts.
2. Identifying Requirements: Here, we will outline the essential requirements that Libyan universities must fulfil to successfully implement e-learning initiatives.
3. Analytical Review of Results: This part will provide an analytical reading of the outcomes of e-learning implementation at Wadi Alshatti University, assessing its effectiveness and impact on the educational process.

- **Research Tools**

A comprehensive survey was utilized to gather data for this study to capture the opinions of faculty members and students, the two primary stakeholders in the educational process.

1. Faculty Members

- An interviews was conducted to gather opinions from faculty members (lecturers) at Wadi Alshatti University regarding the e-learning process and types of audiovisual is been used. The objective is to determine the effectiveness of audiovisual in e-learning, as well as to identify the most appropriate tools the enhance e-learning effectively. Recommendations will also be formulated based on the findings. A total of 40 faculty members from colleges participated in this survey.

2. Students

- Separate questionnaire was distributed to both undergraduate and post graduate students at the university to gather their insights on the methods and tools used as audiovisual for e-teaching. This aims to identify the most user-friendly, effective, and high-quality teaching methods. A total of 200 students from colleges and various scientific departments participated in this survey.

Result and Discussion

- **Use of audio-visual media by Faculty Members**

In this section, we will review the results of the interviews conducted to evaluate the current use of audiovisual tools in the traditional classroom and virtual classrooms of e-learning by faculty members. The findings as shown in table 1, indicate that 50% of the participants reported good level of using audiovisual in their lectures.

However, the other 50% experienced rarely or never use them in the traditional teaching. On the other hand, more than 79% of the participants have used the audiovisual tools in the virtual classrooms, whereas, less than 5% have never used them.

Table 1 Use of audio-visual media in virtual classroom compared to traditional by Faculty members

Audio-visual Use	percentage			
	mostly	occasionally	rarely	never
Traditional classroom	25%	26%	39%	10%
virtual classrooms	34%	45%	18%	3%

Notably, the interviews revealed that 85% of faculty members believes that the use of audiovisual tools have good impacts on the students understanding and memorizing the lecture as showed in Fig 2.

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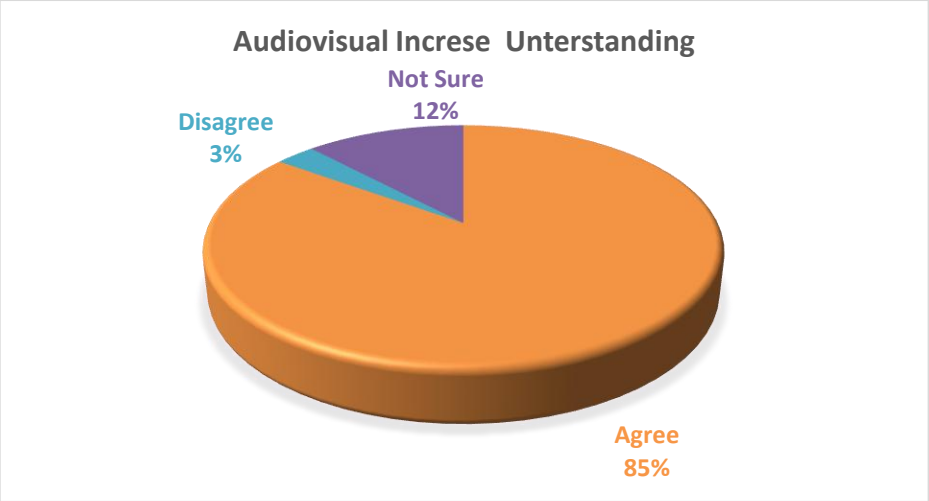

Fig 2: The impact of Audiovisual tool on student's understanding

Moreover, 65% of the participants preferred using audiovisual tools in both traditional classroom and virtual classrooms increases students interacting with their teachers.

Regarding students satisfaction of the module' understanding that includes audiovisual sections a questionnaire was distributed among 200 university students. The results indicate as shown in fig 3, four main elements:

- **Interactivity and Engagement**

The results of the survey indicate a strong consensus among participants regarding the impact of audiovisual tools in e-learning, with 70% of respondents agreeing that these tools significantly enhance interactivity and engagement. This finding aligns with existing literature that emphasizes the importance of multimedia in creating dynamic learning environments. The high percentage of agreement suggests that audiovisual elements not only capture learners' attention but also foster a more immersive educational experience. Respondents highlighted that interactive features, such as videos, animations, and quizzes, make the learning process more enjoyable and relatable, thereby increasing motivation and participation. Additionally, the ability to visualize complex concepts through audiovisual means aids in comprehension and retention, further supporting the notion that these tools are essential for modern educational practices. However, while the majority of participants recognized the benefits, it is crucial to consider the remaining 30% who may not have experienced the same level of engagement. This discrepancy warrants further investigation into the specific factors that influence individual perceptions of audiovisual effectiveness, such as personal learning preferences or the quality of the content provided. Overall, the survey results underscore the vital role of audiovisual tools in enhancing e-learning experiences and highlight the need for continued research and development in this area to maximize their potential.

- **Improve Technical kills**

The survey results reveal that 50% of respondents believe that audiovisual tools in e-learning contribute to the improvement of technical skills, indicating a significant but moderate level of agreement. This finding suggests that while many learners recognize the potential of

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multimedia resources to enhance their technical competencies, there remains a substantial portion of participants who may not perceive these tools as effective in this regard. The respondents who acknowledged the benefits highlighted that audiovisual tools, such as instructional videos and interactive simulations, provide practical, hands-on learning experiences that can enhance understanding and proficiency in technical subjects. However, the mixed responses raise important questions about the effectiveness of current audiovisual resources in fostering technical skill development. Factors such as the quality of the content, the relevance of the tools to specific technical tasks, and the learners' prior experience with technology may influence perceptions of effectiveness. Additionally, the results imply a need for further research to explore the barriers that prevent some learners from fully benefiting from audiovisual tools in developing their technical skills. Overall, while the survey indicates a positive impact of audiovisual tools on technical skill enhancement, it also highlights the necessity for targeted improvements and tailored approaches to maximize their effectiveness for all learners.

- **Improve Understanding**

The survey results indicate a strong positive perception of the impact of audiovisual tools in e-learning, with 78% of respondents agreeing that these tools enhance understanding of the material. This overwhelming majority underscores the effectiveness of audiovisual elements in facilitating comprehension, likely due to their ability to present information in diverse formats that cater to various learning styles. Respondents pointed out that visual aids, such as videos and infographics, help clarify complex concepts and make abstract ideas more tangible, thereby promoting deeper understanding. However, the 17% of participants who disagreed with this statement raises important considerations about the variability in individual learning experiences.

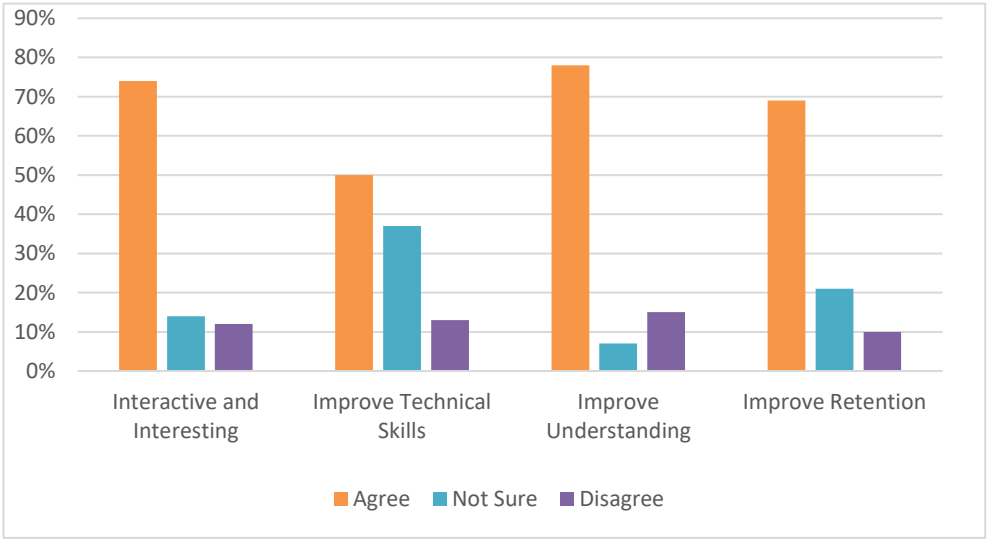

Fig 3: Survey Results

Their scepticism may stem from factors such as the quality of the audiovisual content, the relevance to their specific learning objectives, or personal preferences for traditional learning methods. Additionally, the 13% of respondents who were uncertain highlights a potential area for further investigation, suggesting that some learners may require more exposure to or training in utilizing these tools effectively. Overall, while the survey results strongly support

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the notion that audiovisual tools improve understanding in e-learning, they also point to the necessity of addressing the concerns of dissenting and uncertain respondents to ensure that all learners can benefit from these educational resources.

- **Improve Retention**

The survey results reveal that 69% of respondents believe that audiovisual tools in e-learning significantly improve retention of information, indicating a favorable perception of these resources among the majority of participants. This finding aligns with existing research that suggests multimedia elements can enhance memory retention by engaging learners through visual and auditory stimuli, making the material more memorable. Respondents highlighted that the combination of images, videos, and interactive components helps reinforce learning by creating stronger associations and facilitating deeper cognitive processing. However, the 20% of participants who disagreed with this assertion raises important questions about the effectiveness of audiovisual tools for all learners. Their concerns may stem from individual differences in learning preferences or experiences with particular audiovisual content that did not resonate with them. Additionally, the 11% of respondents who were uncertain about the impact on retention suggest that there may be a lack of familiarity or exposure to effective audiovisual strategies in their e-learning experiences. This mixed feedback underscores the importance of not only incorporating audiovisual tools but also ensuring they are tailored to diverse learning needs and contexts. Overall, while the majority of respondents recognize the benefits of audiovisual tools in enhancing retention, addressing the perspectives of those who disagree or are unsure is crucial for optimizing e-learning outcomes for all learners.

Conclusion

In this paper, we explored the intricate relationship between e-learning and audiovisual effects through a detailed case study, revealing that audiovisual elements play a significant role in enhancing learner engagement, retention, and overall academic performance in digital environments. The research demonstrated that multimedia content, including videos and animations, significantly increases student interest and motivation, leading to improved recall and understanding of the subject matter. However, it also highlighted the necessity of carefully designing these elements to avoid cognitive overload, emphasizing a balance between stimulating content and overwhelming stimuli. Additionally, the study confirmed that diverse learning styles influence interactions with audiovisual materials, suggesting that tailored e-learning experiences can yield more effective outcomes. The findings underscore the importance of audiovisual resources and calling for further research into the long-term impacts of audiovisual effects and the role of emerging technologies in enhancing e-learning. Ultimately, the integration of audiovisual elements in e-learning presents a powerful opportunity to improve educational outcomes, and embracing innovative approaches will be essential for meeting the diverse needs of learners in an evolving digital landscape.

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Appendix 1:

Interview Questions of Faculty Members' Opinions on the Effectiveness of Audiovisual in E-Learning and in General.

Part 1: Evaluating the E-Learning Process

- How would you evaluate the e-learning experience at Wadi Alshatti University so far?

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- What are the positives and negatives you have observed?
- What are the main challenges you face in the e-learning process?
- How do these challenges affect the quality of education?
- Do you feel that students are engaging sufficiently in the e-learning environment? Why or why not?

Part 2: Audiovisual Materials

- Do you use audio-visual media in traditional classroom? And have you use them in the virtual classroom?
- What types of audiovisual materials do you use in teaching online content?
- How would you assess the effectiveness of these materials in enhancing students' understanding of the content?
- Are there any specific materials you prefer to use more than others? Why?
- **Part 3**: Tools and Technologies
- What tools or platforms are you currently using in e-learning?
- How would you evaluate your experience with these tools?
- What tools do you believe would be most beneficial for enhancing e-learning in the future?
- Do you have suggestions for new tools or technologies that could enhance the e-learning experience?
- Do you have any additional comments or points you would like to discuss regarding the use of audiovisual in e-learning?

Appendix 2:

Questionnaire: Survey Students' Opinions on the Effectiveness of audiovisual materials in Electronic learning.

Part 1: General Experience with E-Learning

- How would you rate your overall experience with e-learning at Wadi Alshatti University?
- What do you consider the biggest advantage of e-learning?
- What challenges have you faced while participating in e-learning?

Part 2: Audiovisual Materials

- Which types of audiovisual materials do you find most helpful in your e-learning courses?
- How effective do you find these materials in enhancing your understanding of the course content?
- Are there any specific audiovisual materials you would like to see more of in your courses?

Part 3: Interactivity and Engagement

- How often do you participate during your e-learning courses that include audiovisual materials?
- Do you feel that the audiovisual materials in e-learning platform encourages student engagement?
- What types of audiovisual materials do you find most engaging?
- How would you rate the level of interaction with your instructors during audiovisual materials in e-learning?
- Do you feel motivated to participate in e-learning activities when includes audiovisual materials? Why or why not?

Part 4: Understanding and Retention

- Do you believe that audiovisual tools in e-learning has improved your understanding of the course material?
- How has audiovisual materials in e-learning impacted your ability to retain information?

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- What strategies do you use to help retain information learned through e-learning?

Part 5: Improvement of Technical Skills

- Has your experience with audiovisual materials improved your technical skills?
- What specific technical skills have you developed through e-learning?
- Do you think that audiovisual materials have positive impact on developing technical skills?