Breaking the Distance Education Media Interference Habit: Toward Improving Video Learning in Online Courses

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Abstract: This study examines media interference in remote education and proposes a comprehensive educational model to address these challenges. The research assesses the model's effectiveness, including academic outcomes, student engagement, and satisfaction, through both quantitative and qualitative methods. Findings indicate that reducing media interference, making teaching methods more interactive and engaging, and enhancing students' self-regulation can significantly improve remote learning outcomes. The study offers valuable insights and strategies for understanding and improving the learning experience in remote education.

Keywords: distance education, media interference, learning outcomes, educational modeling, learner characteristics, instructional strategies, technological tools, student engagement, self-regulation skills.

1 Introduction

In the field of education in the twenty-first century, technological advances and digital transformations have changed the way teaching and learning are conducted. Particularly during the COVID-19 epidemic, distance education quickly became the dominant mode of education delivery, and its impact rippled through millions of students and educators worldwide[1] The impact rippled through millions of students and educators around the world. This shift not only facilitated the digitization and networking of educational resources, but also brought new challenges, especially in terms of student attention and learning outcomes. Media distractions are particularly problematic in distance education environments. These distractions include multitasking, mind wandering, and the temptation to use digital devices[2] . These behaviors often lead to distractions that can interfere with students' comprehension and retention of learning content. In fact, studies have found that students in online classrooms use digital devices an average of 11.7 times per class, or 21% of class time. This distracting behavior is not

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limited to the classroom, but is just as prevalent outside of the classroom, thus affecting students' overall academic performance[3].

Therefore, an in-depth study of media interference problems in distance education and how to effectively minimize these interferences is of great importance in enhancing students' learning outcomes. Especially in this area of video learning, strategies for understanding and coping with media interference are crucial for improving the efficiency and quality of learning. As digital devices become more prevalent in students' daily lives and multitasking becomes the norm, exploring the impact of reducing these interruptions on students' learning outcomes becomes more urgent.

2 Literature review

2.1 Development history of distance education

The history of distance education dates back to the early 18th century. In 1728, Caleb Phillipps offered, through an advertisement in the Boston Gazette, his willingness to teach shorthand through the exchange of letters, which is considered an early attempt at distance education. In 1873, the first school of correspondence in the United States was established --Association for the Encouragement of Home Study (Worldwidelearn, 2023). This was followed in 1892 by the University of Chicago, which began offering correspondence courses, becoming the first traditional educational institution in the United States to do so[4].

Remarkable innovations in distance education occurred in the 20th century with the advent of new technologies. For example, in 1922, State College of Pennsylvania began broadcasting courses over the radio; in 1925, Iowa State University began offering credit for five radio broadcasting courses; in 1953, the University of Houston responded to the popularity of radio and television by beginning to offer television courses; in 1965, the University of Wisconsin offered a state educational program for physicians over the telephone; and in 1976, Shoreline Community College began operating as the first "virtual college" without a physical campus. In 1976, Shoreline Community College began operations as the first "virtual college" without a physical campus, and in the 1980s, the Internet began to revolutionize distance education. For example, in 1981, the Western Institute of Behavioral Science's School of Management and Strategic Studies launched online programs, and in 1985, Nova Southeastern University began offering accredited graduate degrees through online programs. In the 1990s, educational institutions began to utilize a variety of real-time and asynchronous online technologies to fuel the rapid growth of distance education universities. For example, in 1992, Michigan State University developed the Computer-Assisted Personalization Approach (CAPA); in 1996, Jones International University became the first fully Web-based accredited university; and in 1997, several institutions adopted the Interactive Learning Network (ILN) e-learning system, which is based on a relational database[5].

The 21st century has seen an explosion in the development and use of Internet technology, which has greatly facilitated the growth of distance education. For example, in 2000, UT Austin launched CourseNotes.com; in 2003, WebCT became a content management system with more than 6 million student users; in 2005, the launch of YouTube,

and its subsequent launch in 2009, YouTube EDU, offered thousands of free lectures; in 2012, Udacity began offering Massive Open Online Courses (MOOCs), and MIT and Harvard followed with the edX platform[6].

2.2 The concept and impact of media interference

Media interference in the learning process refers to the simultaneous use of multiple electronic devices and media by students, resulting in distraction. As digital technology becomes more prevalent in everyday life, multitasking has become a "way of life" for many young people. This phenomenon has attracted academic attention, with researchers attempting to assess how humans cope in highly connected environments and how "chronic multitasking" may reduce our ability to function effectively[7].

The Stanford study, published in 2009 in the Proceedings of the National Academy of Sciences, provides one of the most definitive pieces of evidence of the hazards of multitasking in the digital age. Clifford Nass, a co-author of the study, noted that the findings are virtually unanimous in academia, which is rare in the social sciences. The study shows that people who multitask for long periods of time show substantial deficits on a variety of cognitive tasks, including multitasking. The study also conducted experiments to compare differences in cognitive control and information processing abilities between heavy media multitaskers and light media multitaskers. Heavy media multitaskers were on average 77 milliseconds slower than light multitaskers in recognizing pattern changes when an element of intentional distraction was added to the experiment. In a long-term memory test that asked participants to recall specific elements from earlier experiments, high multitaskers more frequently misidentified those elements that were most frequently used as intentional distractors [8]. The researchers concluded that these experiments "suggest that heavy media multitaskers are disturbed by the multiple media streams they consume, or that those who infrequently multitask are more effective at voluntarily allocating their attention in the face of distraction." These findings raise profound and unanswered questions about the future of human cognition: if the growth of inter-individual multitasking leads to, or encourages the emergence of, a cognitive control trait biased by breadth, then the norm of multiple input streams will have significant consequences for learning, persuasion, and other media effects. However, if these differences in cognitive control abilities and strategies stem from stable individual differences, then many individuals will have increasing difficulty coping with changing media environments.

3 Theoretical framework

Media theory and learning theory provide key perspectives in the theoretical framework for a deeper understanding of the phenomenon of media interference and its impact on the effectiveness of video learning. First, dual-channel theory, proposed by Mayer and Moreno (2003), emphasizes that humans process information through visual and auditory channels. In the context of media interference, these channels are used simultaneously to process information from educational content and multiple media, resulting in

a significant increase in cognitive load. This increased cognitive load not only affects the effective encoding of information, but also the ability of learners to form long-term memories.

In addition, Kahneman's (1973) limited resource theory further explains why students' learning efficiency decreases in a multitasking environment. The theory states that humans have limited cognitive resources available when multitasking. As a result, media interference leads to the dispersal of cognitive resources, especially in learning activities that require deep cognitive processing, thus reducing attention, memory, and comprehension.

From a learning theory perspective, Sweller's (1988) cognitive load theory is crucial in the study of the effectiveness of video learning. It states that learning materials should be designed with learners' cognitive processing abilities in mind to avoid cognitive overload due to excessive visual and auditory elements [9]. In addition, Zimmerman's (2002) theory of self-regulated learning emphasizes the importance of learners' self-monitoring and regulation of the learning process in a video learning environment. This includes learners setting learning goals, monitoring their own progress, and adjusting learning strategies to overcome media distractions and maintain efficient learning.

Finally, Jonassen's (1991) constructivist theory of learning proposes that learning is an active, constructive process [10]. In video learning, this requires a learning environment that promotes active engagement, critical thinking, and deep understanding. However, media distractions may interfere with this process, causing students to engage more in surface learning rather than deep learning. Thus, by synthesizing these theories, we can more fully understand and address the impact of media interference on video learning outcomes.

4 Research methodology

4.1 Model building process

4.1.1 Development of a conceptual framework.

In this model, a conceptual framework with three main components was first developed: media distractions, learner characteristics, and learning outcomes. Media interference is defined as external stimuli that cause distraction during the learning process, including social media notifications, email, and other digital distractions [11]. Learner characteristics encompass cognitive ability, motivation, and prior knowledge, as indicated by psychometric indicators such as attention span, motivation to learn scales, and background knowledge tests. Learning outcomes, on the other hand, were measured through academic performance, self-assessment questionnaires, and engagement tracking.

4.1.2 Definition and operationalization of variables.

In the model, each variable of media interference, learner characteristics and learning outcomes has been precisely defined and operationalized. Media interference is viewed as a multidimensional variable that includes different dimensions of type, frequency,

and intensity. Learner characteristics, on the other hand, involve multiple psychological and educational measurement dimensions including, but not limited to, cognitive ability, motivation to learn, and prior knowledge. The assessment of learning outcomes then combines quantitative (e.g., academic performance) and qualitative (e.g., self-assessment) methods [12].

4.1.3 Assumed relationships in the model.

Two main hypothesized relationships are set out in the model. First, a negative correlation was hypothesized between media interference and learning outcomes, i.e., the higher the level of media interference, the lower the learning outcomes. Second, learner characteristics were hypothesized as potential moderating variables on the relationship between media interference and learning outcomes. Specifically, learners with higher self-regulation or prior knowledge may reduce the negative impact of media interference on learning outcomes.

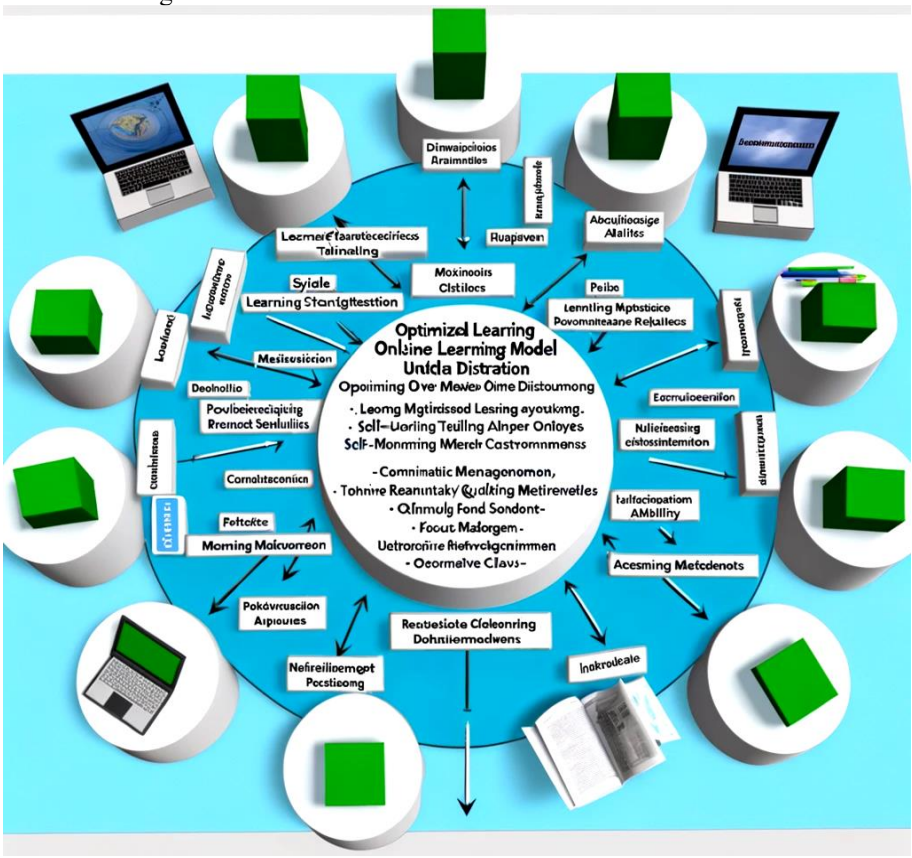

Fig. 1. Model diagram for optimization of online learning under media interference

The model (Fig. 1) is intended to be adapted to a variety of online education environments, including synchronous and asynchronous learning platforms. In synchronous

learning platforms, such as real-time videoconferencing and live classrooms, the model focuses on how to effectively manage and minimize media distractions during real-time interactions. This includes improving student attention and engagement by optimizing classroom layout, controlling external notifications, and designing interactive activities. For asynchronous learning platforms, such as online courses and learning management systems, the model emphasizes how to help learners manage their time and resources autonomously in asynchronous learning environments. This involves providing self-regulation tools, optimizing the proximity and interactivity of learning materials, and using technology tools to reduce external distractions.

4.2 Model Evaluation and Optimization

4.2.1 Assessment criteria.

To ensure that our educational model works optimally in an online education environment, we have developed a series of detailed and comprehensive assessment criteria. First, for the assessment of learning outcomes, we not only focus on students' academic performance, including midterm and final exams and other forms of assessment, but also analyze in-depth their understanding and mastery of key concepts and skills. For user engagement, we assessed students' performance through online discussions, interaction with course materials, and completion of course tasks. This included analyzing the quality of students' activity and participation in forums, chat rooms, or other interactive platforms, the number of times they watched video tutorials, completed online exercises, and how often they accessed other learning resources. Satisfaction assessment gathers students' overall evaluation of course content, teaching methods, and learning resources through questionnaires, interviews, or online feedback systems. This includes students' satisfaction with the quality of instructional materials, content relevance, and course structure, their evaluation of teaching style, interactivity, and innovativeness, and their satisfaction with the learning resources provided[13].

By combining these evaluation criteria, we are able to get a comprehensive picture of the model's effectiveness in real-world applications and make the necessary adjustments and optimizations accordingly. This comprehensive and multi-dimensional evaluation approach enables us to accurately capture the performance of the model in different aspects, thus improving the effectiveness and quality of online education.

4.2.2. Optimization Strategies.

Based on the detailed evaluation of the model, we propose a series of optimization strategies aimed at improving the effectiveness and adaptability of the model in different online education environments. First, we plan to make necessary adjustments to course content or pedagogical approaches that fail to achieve the desired learning outcomes, including improving the presentation of course materials to make them more vivid and engaging, or introducing more interactive and participatory elements, such as real-time quizzes, discussion forums, and interactive teaching and learning activities [14]. In terms of enhancing student engagement and motivation, we will explore new

strategies for introducing gamification elements and collaborative group tasks to increase student motivation and participation. For example, by designing learning activities containing reward mechanisms or encouraging students to participate in team projects, their interest in learning and teamwork can be stimulated. To improve user satisfaction, we will continue to improve the user experience of the learning platform based on student feedback, including optimizing the design of the interactive interface to make it more intuitive and easy to use, providing more personalized learning paths and support, and enhancing the quality and accessibility of learning resources.

In summary, this sequence of evaluation and optimization strategies is an ongoing, dynamic process designed to ensure that the model is able to effectively respond to rapid changes in educational needs and provide a high-quality learning experience. Through this continuous improvement and adaptation, our model will become more flexible and effective, enabling optimal application in different online education environments.

4.3 Integration of theory and practice

4.3.1 Theoretical contributions.

This model makes significant contributions to existing theories of educational technology, particularly in understanding and responding to media interference in online learning. By integrating theories from a variety of fields, including cognitive theory, educational psychology, and user experience design, this model provides a comprehensive framework for analyzing and solving key problems in online learning environments. It not only deepens our understanding of how media interference affects learning outcomes [15], but also presents new perspectives to consider the impact of learner characteristics on the learning process. In addition, the model emphasizes the importance of continuous evaluation and optimization, reflecting the increasing emphasis on flexibility and adaptability in the field of modern educational technology.

4.3.2. Practical implications.

In terms of practical distance education applications, this model has significant value and potential impact. First, it provides specific guidance to educational practitioners in designing and implementing more effective online courses, especially in the selection of course content, pedagogical methods, and technological tools. The model's strategies on how to minimize media distractions and increase student engagement and satisfaction are critical to improving the overall quality and efficiency of online learning. In addition, the implementation of the model helps to enhance the student learning experience [16], especially in the areas of personalized learning and the development of self-regulation skills. Ultimately, these improvements and optimizations will contribute to the effectiveness and accessibility of distance education, providing high-quality educational resources for learners of different backgrounds and needs.

5 Conclusions

This study reveals the prevalence of media interference in distance education and its negative impact on learning outcomes through empirical analysis. It was found that there is a significant negative correlation between students' academic performance and engagement and media interference. However, students' self-regulation skills, especially the application of time management and concentration, can effectively minimize the impact of media interference. In addition, adaptation of teaching strategies was found to be crucial for enhancing learning outcomes, especially in multimedia and multitasking learning environments.

In the future, we hope that these findings and recommendations will stimulate more research and promote theoretical and practical innovations in the field of distance education. We believe that through continued efforts and exploration, we can overcome the challenges posed by media interference and utilize the power of technology to provide a more efficient and satisfying learning environment for learners. Ultimately, this will help us realize the fundamental purpose of education: to train lifelong learners who can adapt to the needs of the future society and economy.

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