A Comparative Analysis of Digital Marketing Online Synchronous Course Delivery With and Without Virtual Reality Software

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Virtual reality (VR) in education has gained momentum in recent years, presenting both promises and challenges. This technology can be found in many areas of learning, but its use is deficient in marketing education. VR technology has improved to offer many choices and is within reach regarding cost and implementation. This study presents and reviews several VR technology software choices and a framework for implementation within digital marketing course instruction. It also investigates the impact of VR on marketing student abilities and perceptions within synchronized online digital marketing courses, focusing on problem-solving, communication skills, course materials rating, and overall course rating. The research aligns with previous findings that suggest VR positively influences problem-solving and communication skills. Student ratings and comments indicated positive student sentiment. The findings underscore the positive impact of VR on student sentiment, satisfaction, and course quality.

Keywords: virtual reality, online learning, digital marketing, student satisfaction

INTRODUCTION

The use of virtual reality (VR) in education has gained momentum throughout recent years. Currently, VR in education shows promise, but not all disciplines utilize VR, and there are many associated challenges. Specifically, there is a lack of VR studies found in the business education disciplines, and one of the main challenges when using VR in education is understanding the pedagogical underpinnings of its approach.

Huang et al. (2020) defined VR as a computer simulation technology that uses three-dimensional graphics and devices to provide a highly interactive experience. Huang et al. (2020) explained that this unique experience is a virtual experience, defined as the psychological and emotional state users experience when interacting with products in an alternative environment driven by technology. Multiple researchers

have suggested that VR can enrich each student's learning experience (Pantelidis,1995; Roussos et al.,1999; Stansfield et al., 2000; Soltanimehr et al., 2019). Chen et al. (2007) found that concepts students learn through VR tend to be remembered and retained easily. Lui et al. (2007) demonstrated earlier that VR is a richer medium that generates a higher sense of presence and interactivity than traditional two-dimensional mediums. VR can create realistic virtual environments, thus immersing themselves in real situations (Guerra et al., 2015). Moreover, VR provides the opportunity for students to engage in real-life scenarios and put to the test their critical thinking and problem-solving abilities.

VR is typically utilized within the science, technology, engineering, mathematics (STEM), and medical fields of study. A review of the literature shows there is a lack of VR usage within the business disciplines. Moreover, VR needs more presence in business disciplines, mainly marketing. Lund and Wang (2019) recognized the need for theoretical and practical frameworks to be developed and considered for student learning. The results of Lund and Wang's (2019) study with libraries demonstrated that "virtual reality may significantly improve student engagement and increase student performance" (p. 3). Soto et al. (2020) conducted a study that sought to learn if student communication skills improved when participating in the VR ImmerseMe platform, and the study concluded that there was a significant positive impact on communication skills and English learning. Soltanimehr et al. (2019) concluded in a dental study that the virtual learning method was more effective than the traditional method for the radiographic interpretation of bony jaw lesions. The outcomes of these studies demonstrated improved student performance, but what about student sentiment, defined as students' interest, excitement, enthusiasm, and satisfaction with the learning experience? Furthermore, does the inclusion of VR platforms within business disciplines, specifically digital marketing, create positive student sentiment in engagement and satisfaction?

Goh and Sanders (2019) claimed that education as a whole is increasingly transforming, and with the assistance of new technologies and tools, pedagogical approaches and activities are changing. Ali (2020) found that due to unpredictable futures, it is essential that educational systems be flexible and resilient moving forward. Moreover, the disruption in learning has forced many academics into a permanent online world with their students. The reason is that some disciplines, through the aftermath of COVID-19, realize course delivery functions efficiently in online environments, saving University resources and meeting student demand for this learning style. Terenko and Ogienko (2020) stated, "COVID-19 has forced the whole world to wake up in a different reality" (p. 174). Thus, there is a need to expand upon the existing VR literature to include VR usage within business disciplines. This paper adds to the body of literature incorporating VR technology into an online Digital Marketing synchronous environment, providing business students an immersive opportunity to learn and engage with their classmates while creating a sense of presence. Specifically, the sentiment of business students' experience will be examined among those enrolled in a digital marketing course with VR and without VR usage. Additionally, this paper will offer valuable insights and a framework for integrating VR technologies within a digital marketing classroom. The remainder of this paper is as follows: literature review, purpose, framework, methods, results, discussion, and conclusion.

REVIEW OF LITERATURE

Rubin and Grey (2020) describe VR as "a technology by which computer-aided stimuli create the immersive illusion of being somewhere else" (para. 2). These virtual worlds enable participants to create avatars, communicate with other avatars, engage with objects, participate in solving problems and achieving goals. VR has gained significant popularity in recent years because of its many applications and the advancement in cost-effective platforms and consumer headsets. In fact, in the past two decades, the focus of education studies has shifted from teaching-oriented to student-centered. As a new paradigm in higher education, student-centered pedagogies have received unprecedented attention (Hou et al., 2023). Focusing on this technology has and continues to revolutionize how we interact with digital content.

Second Life

One of the first providers of VR technology was Liden Lab, founded in 1999. Soon after, Liden Lab 2003 introduced Second Life (SL) (*https://secondlife.com),* which many consumers are familiar with, particularly the virtual marketplace and SL for Education. Over the years, many universities have engaged with SL technologies. For example, the University of South Florida's College of Medicine employs SL to share information between various departments and study the effectiveness of immersive virtual reality in medical training (Worth, 2021). Uses of VR technology include role-playing and integration into medical programs.

LearnBrite

LearnBrite (*https://www2.learnbrite.com*) is an HTML5 VR e-learning platform classified as both VR and augmented reality (AR) immersive learning. Its focus is on the medical field, enterprise, and education. The platform provides robust scenario-based learning in a risk-free environment. Florida Gulf University created an immersive engineering platform where students could simulate and visualize building construction (Bland, 2017). Boeing reported a significantly reduced employee error rate by implementing LearnBrite technology in their training programs. LearnBrite distinguishes its VR and AR technology as a form of gamification (Kishore, 2017).

VirBela

Virbela (*https://www.virbella.com*) creates virtual worlds and claims to pioneer the first enterprise metaverse. It is a virtual world for work, education, and events. A feature of Virbela that makes it affordable to students is the lack of 3D glasses or headsets. No specialized equipment is needed. Stanford's Graduate School of Business LEAD Program degree is completed online. The administration decided to go beyond video conferencing and added Virbela's platform to enhance collaboration, build relationships, and create community. Marineh Lalikian, Director of the LEAD Program, stated that student sentiment was positive. The LEAD's department now requires all students and faculty to engage in a required three-week VR orientation (Burke, 2019).

Compare and Contrast Software

Table 1 compares and contrasts each VR software. Please note that the information provided in Table 1 is based on general knowledge and may be subject to change. It is recommended to visit the respective websites or contact the vendors for the most up-to-date and detailed information on each virtual reality software.

TABLE 1
VIRTUAL REALITY SOFTWARE COMPARISONS

Virtual Reality Software	Second Life	LearnBrite	Virbela
Platform Type	Social virtual world	Virtual training and collaboration	Virtual events and meetings
User Interaction	3D avatars, chat, voice	Avatars, interactive objects, chat, voice	Avatars, interactive objects, chat, voice
Industry Focus	General user base	Education and training	Business and events
Customization Options	Extensive user-generated content, scripting	Customizable environments, templates	Customizable environments, templates

Collaboration Features	Real-time collaboration, virtual economy	Interactive learning scenarios, gamification	Virtual meeting spaces, presentations
Integration Capabilities	Limited third-party integrations	LMS integration, SCORM compliance	Video conferencing integrations, document sharing
VR Hardware Support	Supports both desktop and virtual reality headsets	Supports virtual reality headsets	Supports virtual reality headsets
Mobile Support	Mobile app available	Mobile app available	Mobile app available
Pricing Model	Free with optional premium features	Subscription-based pricing	Subscription-based pricing
Target Audience	General users, social communities	Educational institutions, corporate training	Businesses, conferences, events

LearnBrite, SL, and Virbela are all compelling platforms. VR in the online classroom can be a powerful benefit for students. Piovesan et al. (2012) found that VR can make learning more exciting and fun and improve motivation and attention, promoting student engagement and satisfaction. A study by Kong (2021) touched on VR's impact on students' learning attitudes and effectiveness in an experimental atmosphere. The effects had a profound impact on attitude and effectiveness. The good news is that many platforms have become more affordable and can achieve a rewarding investment for curriculum and enhancing student experiences.

Student Engagement

Many studies have evaluated student engagement within online learning environments. Engagement is significant to learning, and understanding its impact on cognitive learning is paramount. Martinez et al. (2021) conducted a comprehensive study with Columbian Universities on the impact of distance education on their students. Martinez et al. (2021) found that employing digital tools like Google Classroom, Google Meet, and Python on Google Colab led to a more favorable student study environment and promoted student interest and engagement. Engagement requires a sense of presence (Faiola et al., 2013). Creating this sense of presence can be achieved by utilizing VR tools. Faiola et al. (2013) found that "valued accomplishments" within online environments enhanced students' intrinsic motivation (p. 2) and referred to this state of enhancement as "flow." Flow is a psychological state one acquires when participating in an immersed activity, providing a concentrated focus and satisfaction (Csíkszentmihályi, 1996). An essential element to flow is the ability to encounter challenges yet enjoy the process to achieve success. Moreover, a purposeful pedagogical approach is needed when developing VR-related activities; one must consider the process from many perspectives.

Xin (2022) conducted a study that classified learning engagement in VR into two categories: cognitive and emotional. Each engagement category was tested over a week for student engagement performance. Results showed that cognitive and emotional engagement was higher in VR classroom settings. The student's emotional engagement directly correlated to their comfort with virtual social settings and their interactions with classmates and teachers.

Surveyed results from Francescucci and Foster (2013) concluded some mixed results regarding what can be deemed as engagement. On the one hand, metrics like the ease of attending class and keeping track of courses showed that students enjoyed the engagement from an attendance standpoint. However, the same students found asking questions or speaking in face-to-face courses more comfortable. This can be attributed to the lack of simplicity that comes with distance learning, especially when it is new to some

students. The advancements in distance learning software can potentially enhance communication and collaboration within classes, thereby affecting students' comfort levels when participating in VR-based discussions or interactions.

Furthermore, Faiola et al. (2013) conducted a study incorporating the concept of flow in VR distance learning. The researcher sought to discover if participants experienced flow and if their VR experience positively correlated when participating in the SL VR Platform. One hundred fifteen users participated in the study and most possessed intermediate to advanced computer skills. Most had an undergraduate or postgraduate degree and were over 18. The collection of data was done through an online questionnaire. The results found a correlation between flow and telepresence and increased by age group, with 55-65-year-olds experiencing the most flow. Both of which were impactful with the SL learning environment. In addition, this was also an interesting outcome that should be studied further when considering adult learners and the motivating factors SL had in their learning engagement.

Student Satisfaction

Measuring student satisfaction with VR learning needs to be paramount. Satisfaction can come in many forms: enthusiasm, excitement, and interest. Alzahrani and Seth (2021) referred to satisfaction as "the emotional assessment of different outcomes that can also apply to viewpoints seen as lovely or upsetting" (p. 6795). Prior literature has determined that online learning can be beneficial because students are more dedicated to their courses (Martinez et al., 2021). Martinez et al. (2021) found that students often enjoy classes taught in online environments. Implementing another layer to online courses can significantly impact student learning perception and class satisfaction. VR learning can provide opportunities to interact within environments that previously would have been unavailable due to, for example, an event that occurred 100 years ago or the topic being too small for the naked eye to see (Piovesan et al., 2012).

One way satisfaction can be measured during online learning is the motivation and sociability students implement into their courses. It is well known that online learning, especially in an asynchronous modality, can limit student sociability (Childs et al., 2021). However, a recent experiment by Çoban and Göksu (2022) investigated the impactful differences between a VR learning environment and a web-based Adobe Connect learning environment. A controlled experiment with 41 undergraduate students; experimental: 21 and control: 20. The t-test and two-way ANOVA analysis results showed a clear difference. The motivation and perceived sociability were significantly higher in the VR environment than in the web-based Environment (Çoban & Göksu, 2022). Results concluded that VR allowed students to be more interactive using their social skills and gave them the satisfaction needed to be motivated for coursework. Çoban and Göksu (2022) recommend that Institutions be aware of the importance of VR technologies (2022). Even Childs et al. (2021) aligned with Çoban and Göksu (2022) findings in that using VR tools provided students with a feeling of social presence. Francescucci and Foster (2013) found that eight in every ten students were satisfied with VR courses and were favorable or neutral toward retaking another VR course.

Online VR Consideration

The University Professional and Continuing Education Association (UPCEA 2023) reported that 18-22-year-old students enrolling in fully online programs has increased by 2%, and some Universities, such as Oregon State University, have seen an increase of 104% increase over the last five years. It can be assumed that this is not a pandemic trend and a difference in population insights entering secondary education.

McKinsey & Company, a respected global management consulting firm that provides strategic advice to businesses and organizations across various industries, proposed the question, "Demand for online education is growing. Are providers ready?" (Diaz-Infante et al., 2022). Moreover, competition in this space is highly competitive. The Chronicle of Higher Education (2022) noted that not only are student expectations changing and leaning more towards remote learning, but the expectancy of delivering a high-quality remote course option is essential in their learning journey.

Traditional universities' learning focus was knowledge building, acquirement, and career second or sometimes not at all. Today, students expect to gain knowledge and understand its application to industry

and their future careers. Universities have slowly begun their learning shift to new program development that aligns with workforce demands. The switch to digital in design education has created a significant change in information visualization techniques, such as the use of VR, Augmented Reality (AR), and other game engine-based mixed reality (MR) techniques (Ozgen, et al., 2021). One way to achieve this is to deliver a distinctive learning experience. It is essential to understand this changing dynamic and study further the important role VR can have in distance learning and its ability to increase student engagement and motivation. Furthermore, engaging students in real-time collaborative learning may strengthen student satisfaction and engagement, leading to confidence building and preparedness when entering the workforce.

Challenges

There are many challenges to consider when incorporating technology into classes. The first is usually cost. Across disciplines, finding funding for projects has become more challenging for faculty, especially adding technology in the classroom and coursework. Oddly enough, United States (US) universities spend $16 billion on technology annually (Barosevic, 2021), but much of that is applied to something other than coursework.

Another challenge is the faculty's adoption of technology. Faculty are often presented with innovative tools but are too busy or not provided adequate time to learn and incorporate this technology into their coursework. In addition, some prefer to avoid engaging in online teaching. Teaching online requires different competencies than face-to-face teaching environments (Martin et al., 2019; Bolliger and Halupa, 2022). Undoubtedly, this would mean learning more technology in a situation of already limited time. A study conducted by Bolliger and Halupa, (2022) investigated the readiness of faculty members when teaching online. The study surveyed faculty after the Pandemic. The sample included faculty already teaching online before the Pandemic and those who had to shift to online teaching during the Pandemic. An overarching factor was faculty preparedness and its link to confidence. Bolliger and Halupa (2022) suggested having more professional development addressing online teaching and transitions to online facilitation.

Nevertheless, a focus on both online learning and the application of innovative learning tools is needed to provide students with a challenging, interactive online learning environment. We see the challenges that accompany faculty when teaching in online learning; it should also be noted the challenges that accompany the implementation of VR technology into the classroom.

A study by McGovern, 2017 found two main factors impacting faculty adoption of VR technology: faculty capabilities to understand VR platforms and fright. Both challenges also align with online teaching adoption, subsequently having the time to learn and develop pedagogies supporting these student experiences (McGovern, 2017).

Finally, and most importantly, 2023 marks a 10.5% increase in digital marketing spending with continued forecasted growth through 2026 (Oberlo, 2023). Moreover, for every $1 spent, it is predicted that $0.73 of that dollar will be towards digital ads, and most can agree that COVID-19 accelerated this (Oberlo, 2023). As a result, business and marketing students need to be familiar with VR technologies to be prepared for the workforce. Thus, marketing students must be exposed to digital marketing concepts and applications. Creating an immersive learning environment for digital marketing students could lead to intrinsic positive satisfaction and motivate engagement with course material. However, there are limited research studies that actually explore or integrate VR technologies into a business classroom environment, let alone a digital marketing environment.

PURPOSE

This study aims to incorporate VR technology into an online synchronous environment, providing students with an immersive opportunity to learn and engage with their classmates while creating a sense of presence. Thus, this study will offer valuable insights and a framework for integrating VR technologies within a digital marketing classroom.

Next, this study will examine the use of VR software's impact on online synchronous learning environments, specifically within digital marketing classes. Specifically, the following research question is examined:

- Is there a significant difference in student problem-solving, communication skills, and course content satisfaction between a Digital Marketing course that utilizes VR technologies and one that does not contain embedded VR technologies?

FRAMEWORK

Ruben and Grey (2020) presented an industry perspective, describing VR as "a technology by which computer-aided stimuli create the immersive illusion of being somewhere else" (para. 2). They describe some of the interactions within these virtual worlds; the creation of avatars, communication within these virtual worlds, and the ability to solve problems, and achieve goals. Miller (2014) presented an academic perspective, describing VR as a computer-generated environment designed to stimulate a three-dimensional physical environment that provides user interaction. Miller (2014) describes interactions as an environment that allows students to collaborate and experiment and creates student motivation while allowing teachers to be flexible in their instruction.

When deciding on a platform that would be the best fit for instruction, four critical needs were considered: (1) cost, (2) ease of use, (3) computer system compatibility, and (4) 3D Environment. After careful consideration, it was determined that Virbela and LearnBrite met both of these needs.

Next, to further establish the best VR software for our study, several virtual meetings were attended with representatives from each company. An opportunity to engage in the software was provided, and both companies seemed to understand the study's needs and goals. As a result of the meeting and information provided, Table 2, which compares attributes for LearnBrite and Virbella, was created, discussed, and examined by the researchers.

TABLE 2
SOFTWARE COMPARISON ATTRIBUTES AND DECISIONS

Attribute	LearnBrite	Virbela
Cost	Expensive (Starting at $5000). We could upgrade as needed to more features.	Affordable and willing to work with our needs ($3000 for 6 months). We could upgrade as needed to more features.
Ease of Use	The setup was somewhat simple, but some programming knowledge or understanding was needed to fully utilize the platforms' capabilities. We found it a bit complicated.	Simple setup concept, what you see, is what you get. No programming knowledge is required.
Computer System Compatibility	Compatible with Apple, Google Chrome Book, and Windows operating systems.	Compatible with Apple and Windows operating systems. At the time, they were still working on compatibility with Google Chrome Books.
3D Environment	Offered robust 2D and 3D environments	Offered robust 2D and 3D environments

Note. The following table describes the four attributes essential to the decision-making process.

Ultimately, it came down to cost; Virbela met this without hesitation. Another exciting and interactive feature about Virbela was their virtual words available to users outside of ours. When users enter Virbela,

they are not immediately placed in our VR world; they also have the choice to attend a concert and live events, drive a boat with friends, explore buildings, and meet people worldwide. The platform also had available Avatar hosts throughout various VR destinations, ensuring safety and managing questions. Essentially, this was another motivating factor for our students.

The next step was to plan the curriculum for the class. It was essential to create a curriculum framework that could be repeated each semester and compare digital marketing classes that offered embedded VR learning and classes that did not. Several authors supported the importance of creating a plan or framework when implementing VR in the Classroom (Bendeck et al., 2020; Goh & Sanders, 2019; Lund & Wang, 2019; Soltanimehr et al., 2019).

Through the collaboration of key stakeholders, several tasks were created and agreed upon that would be present in both Digital Marketing classes with and without VR. These tasks would provide students with several experiences: (1) lectures, (2) team projects, (3) team offices, (4) American Marketing Association (AMA) Conference room, and (4) faculty offices so students could attend for help, similar to office hours. The synchronous learning environments would occur through the VR Platform Virbela and the non-VR platform Zoom to compare sentiments about the course. All course material was the same, with no differences. Below illustrates the initial implementation framework.

TABLE 3
COURSE DELIVERY COMPARISONS WITH AND WITHOUT VR

Delivery	With VR Digital Marketing Class	Without VR Digital Marketing Class
Lectures	A large digital marketing-themed VR classroom that. The class contained seats for student avatars to sit and be present before the instructor. The VR class contained interactive boards that could show presentations such as PowerPoint and Video. A whiteboard was also available for instructor and student interaction. Student avatars could complete many actions, such as raising hands and talking. Students could also engage by using their avatars to walk up to the whiteboards and placing stickies to illustrate concepts. Students communicated via chat or voice.	Zoom platform where each student zoomed in to attend class. A student could use their video or not. Students were placed in a gallery layout. The instructor shared the presentation and video through the Zoom portal in the middle of the screen interface. Students can use emojis, raise their hands, type in a chat, and speak. Students could also engage with the whiteboard illustrating concepts.
Team Project Collaboration	Each team was provided a personal office within the VR platform. Teams could decorate and customize their office. Each office had several seating options for their avatars. Each office could bring websites and an online library through a media interface. Each office	Teams met within a Zoom Breakout Room. Teams could collaborate with or without video. Students could type into a chat or use their voices to communicate. Teams could share their screens to share and retrieve content.

	enables students to use stickies to brainstorm. Students could communicate with their voice or in chat. When students entered their office, only they could hear each other. Anyone outside the office could not hear each team, creating an excellent sense of privacy. Lastly, teams could call the professor by pressing a button.	
Team Offices	Students had access to their virtual world seven days a week, 24 hours a day. Students could meet with their team in their avatar state to work on assignments and team projects.	Not available. Students had to meet using their technology.
AMA Conference Room	A customized conference room was created for AMA students to hold meetings and work on competitions. The room contained media for students to access about AMA, Digital Marketing Certifications, and other industry news. This provided an opportunity for Digital Marketing Students to attend during meetings and browse the content when a meeting was not being held. This created interest and helped with recruitment.	Not available.
Faculty Offices	Two faculty members created a customized office to meet with students during office hours. The digital marketing instructor also used these offices for one-on-ones to assist students with instruction and learning. This created a safe learning environment. Again, once in these spaces, no one could hear you in the virtual world except the individual/s you were interacting with in this space.	Office hours were held via Zoom. Privacy was achieved by utilizing the Zoom waiting room.

Note. The following table compares the framework used for instruction with and without VR technology.

STUDENT PREPAREDNESS

There have been many studies about the adoption of technology. Furthermore, whether faculty or students, it has been proven that for new technology to be accepted by either, there needs to be training to

gain acceptance (Wang & Chen, 2022; Chen & Xu, 2021; Davis, 2020). A three-step approach was taken via Zoom when implementing VR in the Digital Marketing Classes: (1) introduction, (2) development of an infographic, (3) student play.

Introduction

Using the shared screen feature within Zoom, students were exposed to the Virbela platform via Zoom during the first week of classes on Monday. An entire class session provided an overview of the platform and the context of how the technology would be used in the course. The students were then asked to research the platform for homework and provided instructions on how to sign up. A technical support number was also provided.

FIGURE 1
DIGITAL MARKETING CLASS VIRTUAL REALITY SPACE

Infographic

That Wednesday of the first week of classes, students had an account and some familiarity with the platform. An infographic was provided, and students were instructed to sign in to Virbela.

FIGURE 2
VR 1ST INFOGRAPHIC HANDOUT CREATED WITH CANVA

Note. Example of an infographic provided to students titled "Where to Begin."

Once signed in, students were asked to follow the directions of the infographic and set up their avatars. Virbela contains a robust amount of choices during the avatar setup process. The instructor was present to field questions and assist students in the process. Once the avatar setup was complete, the instructor took students into Virbela's virtual world and explored the features of playing ball, driving a boat, and discovering different avatar settings and expressions. Once students had an opportunity to engage, they were then asked to teleport to the Digital Marketing Class VR Space. Students were allowed to explore the space and to continue to explore the space until the next class meeting on Friday. At the end of class, students were provided a second infographic that contained VR Learning Tips to assist with their exploration homework.

FIGURE 3
VR 2ND INFOGRAPHIC HANDOUT CREATED WITH CANVA

Note. Example of an infographic provided to students titled "Virbela VR Learning Tips."

Student Play

Play is a fascinating concept that should be a part of any adoption of the technology process. This concept can foster creativity, collaboration, creative problem-solving, and deep learning (Marsh et al., 2019; Kafai & Burke, 2014; Resnick, 2007; Gee, 2003). Students were allowed to engage with their Digital Marketing Virtual World on Friday of the first week. Teams were already established and were encouraged to explore together and decorate their team office. The instructor was present to answer any questions individuals or teams may have had.

METHODS

This study was conducted over several semesters, comparing digital marketing classes incorporating VR and classes not incorporating VR into the curriculum. Standard university student evaluations were used at the end of each course when collecting anonymous and unbiased data regarding student sentiment. Feldman (2007) focused on using student evaluations to identify exemplary teachers and practices. Feldman (2007) discovered that student evaluations were an excellent tool for examining class sentiment. Huxham et al. (2021) highlighted the significance of student evaluations as a positive mechanism for assessing class sentiment. In addition, Benton and Cashin (2012) critically examined the misconceptions about student evaluations and teaching effectiveness and supported the use of such instruments. More historical research from Marsh (1984) explored the multidimensional nature of student evaluations. Marsh (1984) concluded evidence that supports the reliability and validity of student evaluations capturing different aspects of teaching quality (p. 749).

The emphasis was placed on four specific criteria areas in the student evaluations among all the courses. These were (1) Ability to apply course materials to improve problem-solving skills, (2) Enhancement of communication skills (orally, in writing, or in performance), (3) I rate the course as, and (4) I rate the course materials as. Each question utilized a Likert scale with the following ratings: (A) Very High, (B) High, (C) Moderate, (D) Low, and (E) Very Low. Once the student completed the evaluation, it was then submitted electronically by the student. Results are processed through the Institutional Effectiveness office and provided to the faculty member digitally.

It is crucial to highlight that the university's standard student evaluations were conducted anonymously, ensuring the evaluation process did not involve the collection of any personal information or identification. The university categorizes the results as secondary data and uses it for academic assessment purposes. Additionally, before conducting the research, the researchers obtained explicit permission from the Associate Provost and Dean of Graduate Education to access, analyze, and use the researchers' evaluation data for the study.

Hypotheses

Four hypotheses were created for the study.

TABLE 4
HYPOTHESES

H_1: Incorporating VR into the classroom improves the ability to apply course material to problem-solving
H_2: Incorporating VR into the classroom improves the enhancement of communication skills
H_3: Incorporating VR into the classroom improves course ratings
H_4: Incorporating VR into the classroom improves course material ratings

Procedure

Data was collected via official university student ratings of instruction (SRI), which follow a 5-point Likert scale: Very High (5), High (4), Moderate (3), Low (2), Very Low (1). Data was formatted and imported into the IBM SPSS statistical package. To test the Significance of our hypotheses, we employ the Chi-Squared (X^2) test. Chi-squared examines the difference between categorical variables much as a T-test examines continuous variables and is the preferred method when variables are categorical.

RESULTS

TABLE 5
DESCRIPTIVE STATISTIC SUMMARY FOR H1: INCORPORATING VR INTO THE CLASSROOM IMPROVES THE ABILITY TO APPLY COURSE MATERIAL TO PROBLEM-SOLVING

H1			
VR		*No-VR*	
Mean	4.67	Mean	4.59
Standard Error	0.06	Standard Error	0.11
Median	5.00	Median	5.00
Mode	5.00	Mode	5.00
Standard Deviation	0.60	Standard Deviation	0.57
Sample Variance	0.36	Sample Variance	0.33
Kurtosis	7.09	Kurtosis	0.24
Skewness	-2.33	Skewness	-1.05
Range	3.00	Range	2.00
Minimum	2.00	Minimum	3.00
Maximum	5.00	Maximum	5.00

Table 5 compares two groups: one with VR incorporation in the classroom and another with No-VR. The purpose was to assess whether VR technology improved the ability to apply course material to problem-solving. Results show that the VR group's ability to apply course material to problem-solving was slightly higher. However, the results should be interpreted cautiously, considering slight differences and outliers in the VR group. Moreover, further evaluation is needed to conclude a more robust difference between the impact of VR integration and the impact on student problem-solving abilities.

TABLE 6
DESCRIPTIVE STATISTIC SUMMARY FOR H2: INCORPORATING VR INTO THE CLASSROOM IMPROVES THE ENHANCEMENT OF COMMUNICATION SKILLS

H2			
VR		*No-VR*	
Mean	4.60	Mean	4.50
Standard Error	0.08	Standard Error	0.14
Median	5.00	Median	5.00
Mode	5.00	Mode	5.00
Standard Deviation	0.78	Standard Deviation	0.75
Sample Variance	0.61	Sample Variance	0.56
Kurtosis	6.39	Kurtosis	-0.10
Skewness	-2.39	Skewness	-1.16
Range	4.00	Range	2.00
Minimum	1.00	Minimum	3.00
Maximum	5.00	Maximum	5.00

Table 6 compares two groups: one with VR incorporation in the classroom and another with No-VR. The purpose was to assess whether VR technology improved the enhancement of communication skills. Results show that the VR group was associated with a slightly higher enhancement of communication skills compared to No-VR. However, considering the slight differences between VR and No-VR, the results should be interpreted cautiously. Moreover, further evaluation is needed to conclude a more robust difference between the impact of VR integration and the impact on enhancing communication skills.

TABLE 7
DESCRIPTIVE STATISTICS SUMMARY FOR H3: INCORPORATING VR INTO THE CLASSROOM IMPROVES COURSE RATINGS

H3			
VR		*No-VR*	
Mean	4.59	Mean	4.33
Standard Error	0.09	Standard Error	0.14
Median	5.00	Median	4.00
Mode	5.00	Mode	5.00
Standard Deviation	0.72	Standard Deviation	0.73
Sample Variance	0.51	Sample Variance	0.54
Kurtosis	5.39	Kurtosis	-0.82
Skewness	-2.19	Skewness	-0.63
Range	3.00	Range	2.00
Minimum	2.00	Minimum	3.00
Maximum	5.00	Maximum	5.00

Table 7 compares two groups: one with VR incorporation in the classroom and another with No-VR. The purpose was to assess whether VR technology improved course ratings. Results show that the VR group had a higher average course rating than the No-VR. However, considering the positive differences between VR and No-VR, further evaluation was needed to conclude a more robust difference between the impact of VR integration and the impact on course ratings. A Chi-Square analysis was conducted.

TABLE 8
CHI-SQUARE ANALYSIS FOR H3: INCORPORATING VR INTO THE CLASSROOM IMPROVES COURSE RATINGS

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.972[a]	3	.005
Likelihood Ratio	13.820	3	.003
Linear-by-Linear Association	2.374	1	.123
N of Valid Cases	95		

a. 4 cells (50.0%) have an expected count of less than 5. The minimum expected count is .85.

The results of the Chi-Square analysis support hypothesis H_3 and suggest that incorporating VR into the classroom is associated with improved course ratings. Both the Pearson Chi-Square and likelihood ratio tests found statistically significant associations between VR integration and course ratings.

TABLE 9
DESCRIPTIVE STATISTICS SUMMARY FOR H4: INCORPORATING VR INTO THE CLASSROOM IMPROVES COURSE MATERIAL RATINGS

H4			
VR		*No-VR*	
Mean	4.62	Mean	4.33
Standard Error	0.07	Standard Error	0.16
Median	5.00	Median	5.00
Mode	5.00	Mode	5.00
Standard Deviation	0.57	Standard Deviation	0.83
Sample Variance	0.33	Sample Variance	0.69
Kurtosis	4.58	Kurtosis	-1.16
Skewness	-1.70	Skewness	-0.72
Range	3.00	Range	2.00
Minimum	2.00	Minimum	3.00
Maximum	5.00	Maximum	5.00

Table 9 compares two groups: one with VR incorporation in the classroom and another with No-VR. The purpose was to assess whether VR technology improved course material ratings. Results show that the VR group had a higher average course material rating than the No-VR. However, considering the positive differences between VR and No-VR, further evaluation was needed to conclude a more robust difference between the impact of VR integration and the impact on course material ratings. A Chi-Square analysis was conducted.

TABLE 10
CHI-SQUARE ANALYSIS FOR H4: INCORPORATING VR INTO THE CLASSROOM IMPROVES COURSE MATERIAL RATINGS

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.621[a]	3	.001
Likelihood Ratio	16.940	3	.001
Linear-by-Linear Association	3.528	1	.060
N of Valid Cases	95		

a. 4 cells (50.0%) have an expected count of less than 5. The minimum expected count is .28.

The results of the Chi-Square analysis support hypothesis H_4 and suggest that incorporating VR into the classroom is associated with improved course material ratings. Both the Pearson Chi-Square and likelihood ratio tests found statistically significant associations between VR integration and course material ratings.

In conclusion, Hypothesis 1 and 2 had no significant results indicating that VR has no impact on the ability to apply course materials to problem-solving or improve communication skills. However, Hypotheses 3 and 4 were supported, indicating that VR can improve course and course material ratings from student ratings of instruction.

Student Evaluation Comments

Adding to this study was reviewing student evaluation comments for the VR-only class. The researchers felt qualitative input might provide further insight since there was significant support for class materials

and ratings with the VR class. Comments provide deep insight into course materials and design (Ginns & Barrie, 2016; Wachtel, 1998; Hattie & Marsh, 1996). The researchers felt this consideration was important because student evaluations provide a safe environment to reveal a student learner's feelings about a class experience. This insight can also serve as a valuable motivator to improve course design. Authors Brooman et al. (2015) referred to this as listening to 'student voice' (p 663). They suggested that student feedback, such as focus groups, which supported students' voices, "were essential to seeing and understanding the students' perspective" (Brooman et al., 2015, p. 671). This student perspective could assist faculty in more robust course design.

Before reviewing the student comments, the researchers sought answers to the following question: did incorporating VR technology into an online synchronous digital marketing class create positive student class sentiment?

Student comments from the VR digital marketing class were collected and reviewed. The comments were broken down into segments, looking for patterns. A consensus of identified patterns was organized into themes. Themes were defined and shared between study members to ensure accurate interpretations. Clarke and Braun (2013) have written extensively about the positive benefits of themed analysis. The authors found that qualitative analysis was more about 'meaning' and the hopes of capturing a social or psychological thought.

TABLE 11
THEMED RESULTS FROM ONLINE SYNCHRONOUS VR DIGITAL MARKETING CLASSES

Theme	Definition	Supporting Evidence
Students' sentiments indicated a great class.	The course with VR provided an engaging learning experience, resulting in positive student sentiment.	*"This was a great course."* *"I would love to see more things like this."* *"I enjoyed the coursework."* *"Fun and innovative way to participate."* *"I really enjoyed the class materials."* *"Wonderful Class."*
Students enjoyed coming to class.	Students found pleasure in coming to class.	*"I enjoyed coming to your class."* *"It made it exciting to come to class."*
Students found the class exciting.	The course content was stimulating.	*"Class was very fun."* *"A great class for anyone with a business major or even minor, especially Marketing majors."* *"The class was exciting."* *"Keeps the students' attention."*

As expected, the student comments were positive, which aligned with the quantitative student scoring. This sense of student sentiment provides valuable insight when pursuing course development, including VR as part of learning.

DISCUSSION

Concerning Hypotheses 1 and 2, the findings suggest no significant difference in student-enhanced communication skills or improved problem-solving between courses with or without VR. Conversely, the variations could be attributed to the use of VR technology. Although student training and infographics were provided, ease of use may have yet to be mastered over a semester.

In addition, even though the findings were slight, VR technology has changed for the positive over the past decade and is more attainable today when considering implementation into course development. It is

recommended to revisit the implications of today's VR technology in student learning, especially in areas that can link to future careers, such as communication and problem-solving.

Regarding Hypotheses 3 and 4, course ratings and course materials, both data sets demonstrate high satisfaction levels in digital marketing courses containing VR technology. The result was an exciting finding since incorporating VR into a course requires instructor and student time, training, and patience.

Overall, both data sets highlight positive outcomes regarding student abilities, course satisfaction, and course materials quality. The slight variations between the two sets may be attributed to sample size differences or other factors specific to each sample. Nonetheless, the consistent positive trends support the effectiveness of courses, including VR, in improving problem-solving skills, enhancing communication abilities, and meeting student expectations.

It is important to note that these findings should be interpreted within the context of the study limitations, such as the relatively small sample sizes and only being executed within Digital Marketing classes. Future research with more extensive and diverse samples would further strengthen the generalizability of these findings. Additionally, qualitative data and in-depth analysis could provide further insights into the specific aspects of the course that contributed to the observed outcomes. Lastly, research should be conducted within asynchronous online environments to determine if VR could provide a sense of presence, leading to positive engagement and satisfaction in student learning.

CONCLUSION

In conclusion, the findings highlight the importance of technology in online course delivery. As mentioned, VR technology is not a new concept but an improved one with many choices available for instructors to incorporate into their online classrooms. VR technology has become more cost-effective, making it reachable when planning budgets to support incorporation into the curriculum. Furthermore, ease of use for faculty and students has been achieved, which is a critical factor for adoption. As we move into a future of virtual reality, augmented reality, and artificial intelligence, it would be our due diligence as marketing faculty to understand these technologies and establish a framework to implement a curriculum that strives for the forthcoming world that equips our students with the necessary skills to succeed in.

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