The Status of Virtual Reality in Training

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Introduction

Virtual reality (VR) has become a training tool that is on the rise for many major companies. Virtual reality is being used in numerous Fortune 500 companies to train employees to be as productive as possible. This training is seen in many areas of development from the health care field to retail and beyond. Since the early 21st century VR started to be used in corporate training and scenario-based learning. It has since taken off. Delivery companies are using this to train drivers and allow them to become accustomed to road hazards. Walmart has prepared their employees for Black Friday shoppers through virtual reality training. Military and healthcare workers are placed into intense high-stakes virtual settings where they can hone their skills. These are just a few examples of how VR is being used and this trend in training is on the rise (VIAR). Using VR to train and to teach is becoming even more popular and useful because learners are interested in technology. These tools already being used in some capacity so the transition to learning with technology is seemless (Nissim, 2017).

Virtual reality provides a setting where employees can learn, train, explore and make mistakes without any real-world consequences, and without any other costs. Aside from these advantages' VR offers users an engaging and immersive setting to learn and hone their skills. It has been seen that this learning environment increases retention rates as well as provides a positive experience to learn. Hands-on learning, after all, has been proven to be the most effective way to learn, as it is how our brains absorb and retain information. It has been shown that presenting material in this way proves beneficial for knowledge construction and development (Liou, 2017)

Virtual reality training allows designers to develop the exact specifications for a scenario. This control allows an opportunity to place learners into a completely controlled environment; unlike a physical learning environment, where other factors can always come into play. The interactive settings being used have been compared to physical learning and have proven to show much better retention results. When students are placed into these virtual learning environments they have shown higher motivation and better performance/retention results (Mayrose, 2012).

Problem Statement

The problem of this study is to examine the status of virtual reality training in real-world applications.

Research Objectives

The objectives of this study include:

- 1. Identify best practices being used by those training with virtual reality.
- 2. Identify what percentage of training is being done this way.
- 3. Identify the top virtual reality software being used in training.
- 4. Identify ways of measuring the success of the programs in use.

Significance of the Problem

Virtual reality training is trending upward, many corporations have recognized the benefits of using this training to set their employees up for success. Understanding the use of VR as well as the platforms being used will allow for even more companies to find ways to incorporate VR into their training. Current utilizations being used today have been shown to provide a thoroughly engaging atmosphere for learning. Furthermore, when educators have used VR settings to train their ability to manipulate the setting to the exact specifications they need has been an effective tool. Virtual reality is not only providing more prepared workers to enter the workforce, but it is providing an opportunity for instructional designers to sharpen their skills as well. Professor Cooper, of Harvard Medical School, states that "Simulation is a tool for developing better educators, not just for safety, but to educate healthcare providers better and faster... and it is clearly doing that (Larsen, 2009)."

Establishing the current uses of VR will allow a better understanding of the future in training. While this is a relatively new area in training the applications and advancements being made lend themselves to a future in VR for all areas of work. Virtual reality training began being used in the most intense environments which included military training and surgical operation training. There has been a huge rise in VR training in all areas of the workforce. This is a trend

that will continue as the success of the programs lend itself to applications in all areas including retail and manufacturing.

Definition of Terms

For the purpose of this study, the following terms have been operationally defined: *Virtual Reality-* is a simulated experience that can be similar to or completely different from the real world.

Immersive Virtual Reality-a digital technology that allows users to experience artificial environments as the real world. ... Instead, by wearing a head-mounted display (HMD) and using wireless controllers, users can explore digital 3D environments and interact with computer-generated content.

Text-based Networked Virtual Reality- virtual worlds are real-time multi-person virtual environments created through **text** descriptions rather than graphics.

Augmented Reality- is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory.

Review of Related Literature

Current Utilizations

Cognitive Development

Retention and Motivation

Toth, E. E. (2015). Analyzing "real-world" anomalous data after experimentation with a virtual laboratory. *Educational Technology Research and Development*, 64(1), 157-173. doi:10.1007/s11423-015-9408-3

In the study, learners were using virtual laboratories as well as standard classroom instruction to prepare for real-world settings and situations. The study was aimed at the medical field where students studied DNA and Gel Electrophoresis testing. These tools have shown effectiveness in supporting learning. This study aimed to decide which would be more effective: a virtual laboratory or a hands-on laboratory. Results have shown benefit for instructional designers on using virtual laboratories for learning purposes. This study did show somewhat of a disconnect between the material being presented and students making a connection to real-world situations.

Reynolds, T., & Kong, M. (2011). Learning without Patients. *BMJ British Medical Journal,* 342(7788), 83-84.

The report being done was utilizing a simulated environment to establish the idea it could replace the traditional learning methods in place for the medical field. The use of simulated environments is growing worldwide- the review provides an outlook on what is being done and projected growth into the field. It is stated that there are some limitations in an environment where you can control all factors, but when applied well you can create a very real setting for which the students can learn. Professor Cooper, of Harvard Medical School, states that "Simulation is a tool for developing better educators, not just for safety, but to educate healthcare providers better and faster... and it is clearly doing that."

Larsen, C. R. (2009). Effect of virtual reality training on laparoscopic surgery: Randomised controlled trial. *BMJ: British Medical Journal*, 338(7705), 1253-1256. doi:10.1136/bmj.b2074 This study was done to assess the effect of virtual reality training on the actual laparoscopic operation. Through this study, the participants in the experimental group performed significantly better than those in the control group in both total scores as well as in time to complete the operation. These goals were helpful to achieve due to the time of the surgery in reality- which tends to be an extended time. The study showed that the learners utilizing the simulator surpassed the learning curve- this was said to lead to fewer complications when performing these surgeries.

De Jong, T., Linn, M. C., & Zacharia, Z. C. (2013). Physical and Virtual laboratories in science and engineering education. *Science*, *340*(6130), 305-308. doi:10.1126/science.1230579

The use of a virtual reality environment for learning can enable immediate data to be available. These also require less setup and cleanup time than a physical environment; thus, more work can be done in the same amount of time. The students working in this particular engineering lab found they achieved the same desired results as they would have in a physical classroom experience. In some instances, the students performed better than those in the physical classroom. It was determined that a combination of these two environments may produce the best results for the students- this is due to manipulation of some labs in a virtual setting is much cleaner than in the physical space.

Vidal, V. L., Ohaeri, B. M., John, P., & Helen, D. (2013). Virtual reality and the traditional method FOR Phlebotomy training among College of nursing students in Kuwait. *Journal of Infusion Nursing*, 36(5), 349-355. doi:10.1097/nan.0b013e318243172f This study is addressing the traditional method of teaching nursing students phlebotomy skills. This technique is important for mastery due to they are required to safely collect the sample from patients. The skills developed through training are important because patient safety and care are important in health care. Students in the control group were given the traditional training using a plastic simulated arm and those in the experimental group received virtual reality simulation training of an imagined or real environment. The virtual simulation system used was CathSim for this study. Metrics from the training assessed included pain level, duration, number of reinsertions, time of the procedure among others. In all areas where data was collected the experimental group out-performed the control group. While neither the method was perfect, this study suggests that simulated arms were the more effective way to train nursing students.

Kneebone, R., & Aggarwal, R. (2009). Surgical training using simulation. *BMJ*, 338 (May 14 2). doi:10.1136/bmj.b1001

In the surgical field simulation is key to mastering techniques. These tools provide a realistic look at operations. Progress has been seen when using such systems allowing the learner to practice before a procedure is done. In this article, the idea of integrating new technology into what is being done is the key to merging the two for the most effective outcome. Integrating the current uses in the field with new and emerging technologies can be a very useful tool to enhance the learning experience for those in the surgical profession.

Liou, H., H., S. J., Chen, S. Y., & Tarng, W. (2017). The influences of the 2D Image-Based augmented reality and virtual reality on student learning. *Journal of Educational Technology & Society*, 20(3), 110-121. Retrieved February 20, 2021, from http://www.jstor.org/stable/10.2307/26196123?refreqid=search-gateway Students were given hypothetical scenarios and an augmented and virtual reality setting. The setting was an astronomy lesson where the students received information using the two different systems. Cognitive Load Theory (CLT) was used in developing the structure of how the material was being presented to the students. In both cases, they were given the same material in a virtual format. The degrees of mental load utilizing these systems were assessed in the data. The system was beneficial for knowledge construction. Instructional designers can utilize this evidence when designing learning and training using a virtual platform.

Vasiljevic, J., Jovanov, G., Radovanovic, R., Jovanov, N., & Vranjes, D. (n.d.). Influence of virtual simulator on the change of views on behaviour in traffic case study. Retrieved February 11, 2021, from https://files.eric.ed.gov/fulltext/ED590298.pdf

This study was done to show the effectiveness of utilizing virtual simulations to show the risks and threats to drivers. When exposed to these training devices participants were questioned about their driving, decision-making skills, and attitudes before and after the experience. In almost all measures the results post-simulation revealed that the drivers responded much differently. In these results what many believed to be safe practices suggested they were unsafe after utilizing the simulator. The results of the study revealed that when drivers experienced a real-life simulation they changed their attitudes about driving at high speeds and safety protocols.

Harmon, S. W. (2011). Virtual worlds as a trigger for transformative learning. *Educational Technology*, *51*(2), 28-32. Retrieved from http://www.jstor.org/stable/10.2307/44429914?refreqid=search-gateway

This article was focused on adult learning theories and virtual learning as a way to present an opportunity for self-reflection during the learning process. "At its core, transformative learning requires learners to engage in deep critical reflection." Within this article, Harmon tells a story that brings to light the complacency we tend to express with learned behaviors. The idea of doing something the same way because this is "how we learned to do it" happens often. Placing a learner into a virtual environment where they must think on their feet allows them to get away from the comforts they may feel and into an unknown reaction response. In a real-world working environment this is often the case- so a virtual setting allows this experience to take place without the high stakes results. Setting up a virtual reality learning experience also allows the learner to develop alternate viewpoints, this can become helpful when they utilize this in a real-world scenario.

Nissim, Y., & Weissblueth, E. (2017). Virtual reality (VR) as a source FOR self-efficacy in teacher training. *International Education Studies*, 10(8), 52-59. doi:10.5539/ies.v10n8p52

This study was conducted on teachers in the K-12 education system. The virtual experience was used to enhance the skills of the teachers. The main themes from this study included:

- Learning processes became more entertaining.
- Better understanding and use of technology and VR in teaching.
- Better development of creative learning and creativity in teaching.
- More interest in technology.
- Increased problem-solving skills.
- Increased stamina and endurance in learning
- Increased ability to associate what was learned with real life.

Through the use of virtual learning, these teaching professionals were able to connect much more meaningfully with the content they were teaching.

Gyldendahl Jensen, C. (2017). Collaboration and Dialogue in Virtual Reality. *Journal of Problem Based Learning in Higher Education*, 5(1), 85-110.

This study was based around the use of a blended learning environment utilizing standard learning procedures as well as a virtual setting. The design process for the study centered around game-based learning as a platform for cognitive development. The main focus of the study was to compare the virtual learning environment to the collaboration needed to be successful in the program. This clearly shows that cognitive skills are developed in a game-based learning environment, especially those that require collaboration with others. Results from the study revealed situations in the virtual world develop extensive cognitive skills and learning transfer when collaboration is required.

Kniffin, T. C., Carlson, C. R., Ellzey, A., Eisenlohr-Moul, T., Beck, K. B., McDonald, R., & Jouriles, E. N. (2014). Using virtual reality to explore self-regulation in high-risk settings. *Trauma, Violence, & Abuse, 15*(4), 310-321. doi:10.1177/1524838014521501

In this study, participants were placed into a virtual environment where they were subjected to safety situations. Data were collected regarding the cardiovascular response of the participants and compared to a control group. The data recorded centered around self-regulation and breathing control when in an adverse situation. The virtual reality program was used to improve safety and decision-making in situations where uncertain outcomes exist. The participants were all females and were subjected to unwanted advances from a male avatar in an adjacent room. Respiration rates and breathing were recorded during the interactions. While this was a gaming platform the effect of realism was clear in the debriefing results from participants. The study shows the importance of self-regulatory training for those in high-risk working environments.

Marquardson, J., & Gomillion, D. L. (2019). Simulation for Network Education: Transferring Networking Skills Between Simulated to Physical Environments. *Information Systems Education Journal*, 17(1), 28-39.

In contrast to the usual intense situations that simulation and virtual reality are frequently used, this study took a look at simple skills to show the usefulness of virtual reality in other areas. The skills learned in a simulated environment must be transferred into a real-world application. In this study, the learners were placed into a simulated learning environment to increase their computer networking skills. Great importance was placed on the simulation matching the real world; if not transfer is unlikely to occur or to be very low. The students utilizing the simulation came to gain a significant amount of confidence with computer networking because of the opportunity to practice this skill. The use of virtual reality simulation allowed for more practice than did the physical environment. For this reason, students gained better skills working with computer networking equipment.

Herrmann, K. (2019). Animal experimentation: Working towards a paradigm change. In *Animal experimentation: Working towards a paradigm change* (pp. 551-561). Leiden: Brill.

The chapter of this text reviewed common practices in health care. Studies cited revealed that simulators improved the overall accuracy of learners. Those trained in this way showed greater accuracy in later procedures than those that had not been given the simulation training.

Moreover, these simulators developed higher-order thinking skills. A great percentage of the students indicated more complex decision-making was required when going through the simulated learning process. This proved to be an indicator of learning transfer in the simulated environment and can be seen as a best training practice in the field.

Yildirim, G., Yildirim, S. & Dolgunsoz, E. (2019). The effect of VR and traditional videos on learner retention and decision making. World Journal on Educational Technology: Current Issues. 11(1), 021–029.

This study was done to evaluate the effects of VR on retention by comparing it will standard training. Learner retention, as well as decision making, were evaluated and compared to 2D learning. While the study revealed that the VR setting had little effect on short-term retention, it did show a significant effect on long-term retention. Eye movement analysis revealed that the learners revisited important content more often in the virtual setting, thus possibly leading to long-term retention. "Results showed that students scored and remembered better in VR condition even after 4 weeks. Researchers concluded that VR technologies not only promoted the motor skills of learners but also contributed long-term retention." The thought behind this may be that virtual reality is more motivating, interesting, more entertaining, and requires students to be more active and engaged in the learning process.

Mayrose, J. (2012). Active learning through the use of virtual environments. *American Journal of Engineering Education (AJEE), 3*(1), 13-18. doi:10.19030/ajee.v3i1.6885

This study set out to study interactive environments and how they affect learning, engagement, and preference. The students in this sample were more motivated and much more

interested in learning when exposed to a virtual setting. Students were more motivated when using the immersive environment than with traditional methods which may lead to greater learning and retention. The group that was exposed to the virtual learning environment showed a stronger retention rate and more interest than those in the control group.

Research Methodology

This study will utilize surveys, questionnaires, and direct interviews to collect data and information. This will be a one-time survey of the companies' use of virtual reality within their employee training and workforce development. The survey provided in Appendix B will be utilized and sent to all current fortune 500 companies (appendix A) human resource and training development personnel. Strong efforts in planning will be done to connect with training and development management in each company. During the initial phases of the study locating the company contacts will be instrumental to ensure a stronger percentage of participation in the study as well as the most comprehensive results.

Additional follow-up methods may be used by direct interviewing of participants in an attempt to clarify information. It may be necessary to follow-up with some of these companies to determine a more in-depth understanding of what is being done in their training departments using virtual reality. These interviews may also be used to gather additional information to be used in a further study regarding participant satisfaction with the use of virtual reality in training. Results from this study will be compiled and broken down into groups based on the type of workforce being assessed. These companies will be grouped by the type of service they provide such as retail or manufacturing.

Assumptions of the Study

This study assumes that participating companies have an understanding of virtual reality in training. These participants are also reporting factual results of their training and development programs to the best of their abilities.

Limitations of the Study

This study will be limited only to the identified companies at this time. Extension to others utilizing virtual reality in the training of employees may be done in future studies. The study will be limited by the number of participating companies that reply.

Outcomes of the Study

The outcomes of this study will give an overview of the frequency, methods, and where virtual reality is being used. It will also provide a strong idea of what software and programs are leading the field. Additionally, the results will show how the use of VR is being measured and how these results are reported by those using the technology.

Once this data has been collected it will lead to a compilation of where training and development are in regards to using this technology as well as a comprehensive view of the return on investment companies are seeing from the implementation of virtual reality training. When the study is reviewed an attempt will be made to determine the effect of this training method on the success of these high-profile companies.

Timeline

This study will be conducted over 14 weeks. This includes the development and collection of surveys as well as follow-up contacts and result analysis.

]	- PHAS]	E ONI	E	PHASE TWO				PHA	SE TH	REE	PHASE FOUR		
TASK/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Project Ideas and Initiation														
Development of Project														
Goal Setting														
Current Research in VR														
Develop List of Participants														
Contact HR Departments														
Project Participation Monitoring														
Review Research														
Attempt to Contact Companies that have not replied.														
Organize Returned Surveys														
Develop Report or Surveys														
Present Findings														
Establish Future VR Predictions														

Budget

All items will be submitted, collected, and presented digitally at this time.

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Appendix A

1	Walmart	26	Home Depot	51	PepsiCo
2	Amazon.com	27	Phillips 66	52	Humana
3	Exxon Mobil	28	Comcast	53	Prudential Financial
4	Apple	29	Anthem	54	Archer Daniels Midland
5	CVS Health	30	Wells Fargo	55	Albertsons
6	Berkshire Hathaway	31	Citigroup	56	Sysco
7	UnitedHealth Group	32	Valero Energy	57	Lockheed Martin
8	McKesson	33	General Electric	58	HP
9	AT&T	34	Dell Technologies	59	Energy Transfer
10	AmerisourceBergen	35	Johnson & Johnson	60	Goldman Sachs Group
11	Alphabet	36	State Farm Insurance	61	Morgan Stanley
12	Ford Motor	37	Target	62	Caterpillar
13	Cigna	38	IBM	63	Cisco Systems
14	Costco Wholesale	39	Raytheon Technologies	64	Pfizer
15	Chevron	40	Boeing	65	HCA Healthcare
16	Cardinal Health	41	Freddie Mac	66	AIG
17	JPMorgan Chase	42	Centene	67	American Express
18	General Motors	43	United Parcel Service	68	Delta Air Lines
19	Walgreens Boots Alliance	44	Lowe's	69	Merck
20	Verizon Communications	45	Intel	70	American Airlines Group
21	Microsoft	46	Facebook	71	Charter Communications
22	Marathon Petroleum	47	FedEx	72	Allstate
23	Kroger	48	MetLife	73	New York Life Insurance
24	Fannie Mae	49	Walt Disney	74	Nationwide
25	Bank of America	50	Procter & Gamble	75	Best Buy

76	United Airlines Holdings	101	Enterprise Products Partners	126	Qualcomm
77	Liberty Mutual Insurance Group	102	Northwestern Mutual	127	NGL Energy Partners
78	Dow	103	3M	128	CBRE Group
79	Tyson Foods	104	Abbott Laboratories	129	Baker Hughes
80	TJX	105	CHS	130	Synnex
81	TIAA	106	Travelers	131	Dollar Tree
82	Oracle	107	Philip Morris International	132	Cummins
83	General Dynamics	108	Raytheon	133	United Natural Foods
84	Deere	109	Hewlett Packard Enterprise	134	Micron Technology
85	Nike	110	Arrow Electronics	135	Amgen
86	Progressive	111	ViacomCBS	136	Penske Automotive Group
87	Publix Super Markets	112	Dollar General	137	Visa
88	Coca-Cola	113	U.S. Bancorp	138	Broadcom
89	Massachusetts Mutual Life Insurance	114	Starbucks	139	Nucor
90	Tech Data	115	Bristol-Myers Squibb	140	Gilead Sciences
91	World Fuel Services	116	US Foods Holding	141	Southwest Airlines
92	Honeywell International	117	Mondelez International	142	Halliburton
93	ConocoPhillips	118	Paccar	143	CenturyLink
94	USAA	119	Thermo Fisher Scientific	144	International Paper
95	Exelon	120	Macy's	145	Eli Lilly
96	Northrop Grumman	121	Jabil	146	Aflac
97	Capital One Financial	122	Kraft Heinz	147	Lennar
98	Plains GP Holdings	123	Duke Energy	148	Occidental Petroleum
99	AbbVie	124	Tesla	149	Union Pacific
100	StoneX Group	125	PBF Energy	150	Rite Aid

151	PNC Financial Services Group	176	Emerson Electric	201	Principal Financial
152	DuPont	177	WestRock	202	Ross Stores
153	Southern	178	CDW	203	Colgate-Palmolive
154	AutoNation	179	Jones Lang LaSalle	204	American Electric Power
155	DXC Technology	180	Sherwin-Williams	205	Nordstrom
156	McDonald's	181	Fluor	206	Jacobs Engineering Group
157	Marriott International	182	PayPal Holdings	207	Waste Management
158	ManpowerGroup	183	D.R. Horton	208	C.H. Robinson Worldwide
159	Bank of New York Mellon	184	HollyFrontier	209	PPG Industries
160	Hartford Financial Services Group	185	Tenneco	210	Booking Holdings
161	Danaher	186	EOG Resources	211	Omnicom Group
162	Whirlpool	187	Becton Dickinson	212	Loews
163	AECOM	188	Lincoln National	213	Ecolab
164	Netflix	189	PG&E	214	Stryker
165	Kohl's	190	salesforce.com	215	Estee Lauder
166	Lear	191	Mastercard	216	Goodyear Tire & Rubber
167	Altria Group	192	General Mills	217	Truist Financial
168	Performance Food Group	193	Molina Healthcare	218	Applied Materials
169	Avnet	194	Cognizant Technology Solutions	219	BlackRock
170	Synchrony Financial	195	Marsh & McLennan	220	Stanley Black & Decker
171	Genuine Parts	196	XPO Logistics	221	Freeport-McMoRan
172	NextEra Energy	197	Dominion Energy	222	Texas Instruments
173	CarMax	198	Western Digital	223	Biogen
174	Tenet Healthcare	199	Gap	224	Parker-Hannifin
175	Kimberly-Clark	200	Aramark	225	Reinsurance Group of America

226	Howmet Aerospace	251	DISH Network	276	Xcel Energy
227	Automatic Data Processing	252	Lithia Motors	277	Corning
228	Uber Technologies	253	DTE Energy	278	W.W. Grainger
229	Illinois Tool Works	254	American Family Insurance Group	279	Ball
230	DaVita	255	Farmers Insurance Exchange	280	Fox
231	Discover Financial Services	256	Consolidated Edison	281	Universal Health Services
232	Land O'Lakes	257	LKQ	282	Baxter International
233	VF	258	Sempra Energy	283	Norfolk Southern
234	Corteva	259	Edison International	284	Navistar International
235	Las Vegas Sands	260	CenterPoint Energy	285	Adobe
236	Textron	261	Quanta Services	286	J.C. Penney
237	Kellogg	262	Murphy USA	287	Discovery
238	Guardian Life Ins. Co. of America	263	Expedia Group	288	Keurig Dr Pepper
239	Qurate Retail	264	Group 1 Automotive	289	Leidos Holdings
240	Core-Mark Holding	265	Bed Bath & Beyond	290	IQVIA Holdings
241	Community Health Systems	266	Unum Group	291	Reliance Steel & Aluminum
242	Kinder Morgan	267	CSX	292	Nvidia
243	BJ's Wholesale Club	268	AutoZone	293	Entergy
244	State Street	269	Pacific Life	294	FirstEnergy
245	Ameriprise Financial	270	Vistra Energy	295	eBay
246	Global Partners	271	Charles Schwab	296	Boston Scientific
247	United States Steel	272	Crown Holdings	297	Office Depot
248	L Brands	273	Ally Financial	298	Molson Coors Beverage
249	MGM Resorts International	274	Laboratory Corp. of America	299	Steel Dynamics
250	L3Harris Technologies	275	Live Nation Entertainment	300	Mutual of Omaha Insurance

301	Sonic Automotive	326	Hertz Global Holdings	351	Alleghany
302	Alcoa	327	Altice USA	352	Icahn Enterprises
303	Fidelity National Information Services	328	Newmont	353	Voya Financial
304	Henry Schein	329	Cheniere Energy	354	Ryder System
305	Republic Services	330	Advance Auto Parts	355	Air Products & Chemicals
306	Liberty Media	331	Lam Research	356	Mosaic
307	Peter Kiewit Sons'	332	Owens & Minor	357	Huntington Ingalls Industries
308	Interpublic Group	333	Equitable Holdings	358	Berry Global Group
309	PulteGroup	334	Conagra Brands	359	Anixter International
310	AES	335	Markel	360	Alaska Air Group
311	Fiserv	336	Jones Financial (Edward Jones)	361	Yum China Holdings
312	BorgWarner	337	Hormel Foods	362	Dick's Sporting Goods
313	Oneok	338	Hilton Worldwide Holdings	363	Caesars Entertainment
314	O'Reilly Automotive	339	Univar Solutions	364	Genworth Financial
315	Assurant	340	United Rentals	365	Targa Resources
316	Newell Brands	341	Pioneer Natural Resources	366	Coty
317	Public Service Enterprise Group	342	Delek US Holdings	367	Dana
318	News Corp.	343	Eastman Chemical	368	Thrivent Financial for Lutherans
319	Calpine	344	EMCOR Group	369	Autoliv
320	Auto-Owners Insurance	345	Avis Budget Group	370	SpartanNash
321	Mohawk Industries	346	J.B. Hunt Transport Services	371	Eversource Energy
322	PVH	347	Xerox Holdings	372	Darden Restaurants
322	Campbell Soup	348	Wayfair	373	Chesapeake Energy
324	NRG Energy	349	KKR	374	National Oilwell Varco
325	Fifth Third Bancorp	350	AGCO	375	Fidelity National Financial

376	Erie Insurance Group	401	Western & Southern Financial Group	426	Toll Brothers
377	Oshkosh	402	W.R. Berkley	427	Old Republic International
378	Casey's General Stores	403	Motorola Solutions	428	Asbury Automotive Group
379	WESCO International	404	Thor Industries	429	Arthur J. Gallagher
380	Tractor Supply	405	Regeneron Pharmaceuticals	430	MasTec
381	CommScope Holding	406	Spirit AeroSystems Holdings	431	Owens Corning
382	Huntsman	407	J.M. Smucker	432	Magellan Health
383	American Financial Group	408	PPL	433	Dover
384	Masco	409	Insight Enterprises	434	Beacon Roofing Supply
385	Sanmina	410	Quest Diagnostics	435	Avery Dennison
386	Amphenol	411	KeyCorp	436	Hanesbrands
387	Williams	412	Veritiv	437	Packaging Corp. of America
388	Westinghouse Air Brake	413	DCP Midstream	438	M&T Bank
389	Expeditors Intl. of Washington	414	American Tower	439	NCR
390	Andersons	415	Graybar Electric	440	Northern Trust
391	Westlake Chemical	416	WEC Energy Group	441	Cintas
392	Constellation Brands	417	NVR	442	Polaris
393	Frontier Communications	418	Ulta Beauty	443	CMS Energy
394	JetBlue Airways	419	Devon Energy	444	Seaboard
395	Citizens Financial Group	420	Blackstone Group	445	Intuit
396	Raymond James Financial	421	Dean Foods	446	Regions Financial
397	Foot Locker	422	Fortive	447	FM Global
398	Hershey	423	UGI	448	Advanced Micro Devices
399	Zimmer Biomet Holdings	424	Burlington Stores	449	Ovintiv
400	Cincinnati Financial	425	Builders FirstSource	450	Booz Allen Hamilton Holding

451	S&P Global	476	First American Financial
452	Rockwell Automation	477	Graphic Packaging Holding
453	O-I Glass	478	NetApp
454	Wynn Resorts	478	HD Supply Holdings
455	Securian Financial Group	480	TravelCenters of America
456	Alliance Data Systems	481	Olin
457	Weyerhaeuser	482	Robert Half International
457	Brighthouse Financial	483	EnLink Midstream
459	Intercontinental Exchange	484	Avantor
460	American Axle & Manufacturing	485	Tapestry
461	Hess	486	TD Ameritrade Holding
462	ABM Industries	487	Analog Devices
463	Activision Blizzard	488	Ameren
464	GameStop	489	Williams-Sonoma
465	Apache	490	Realogy Holdings
466	Science Applications International	491	Commercial Metals
467	AK Steel Holding	492	Rush Enterprises
468	Dillard's	493	Franklin Resources
469	Ralph Lauren	494	Fortune Brands Home & Security
470	Celanese	495	Levi Strauss
471	R.R. Donnelley & Sons	496	Crown Castle International
472	Zoetis	497	Simon Property Group
473	Ascena Retail Group	498	Cerner
474	Clorox	499	Post Holdings
475	Ingredion	500	Huntington Bancshares

Appendix B

This survey will be sent to all companies listed in Appendix A.

1. Company Name: _____

2. Type of Company

- Retail
- □ Industry
- □ Manufacturing
- □ Healthcare
- **O**ther

3. Does the company currently use Virtual Reality to train employees?

- □ Yes
- 🛛 No

If no:

3A. Have you considered this method to train employees?

- **U** Yes
- 🛛 No

3B. Is cost the major factor in whether to use virtual reality technology in training?

- □ Yes
- 🛛 No

3C. What are other factors in deciding to use this technology for training and development?

If yes:

3A. What percentage of your employees utilize virtual reality technology for training?

- \Box Less than 10%
- **1**0%-30%
- **30%-50%**
- **50%-70%**
- \Box More than 70%

- 3B. What types of this technology are you currently using (check all that apply)
 - □ Immersive Virtual Reality
 - □ Text-based Networked Virtual Reality
 - □ Augmented Reality

3C. Is the technology used across all areas of your organization or only in specific training areas? (i.e. company drivers, line workers....)

- □ Company-wide
- **G** Specific Training Areas

3D. Do you have a procedure in place to measure the success of these programs?

- **U** Yes
- 🛛 No

3E. If yes, what tools are used? (check all that apply)

- □ Test scores during and after the training.
- □ Evaluation of applied learning projects.
- Performance Assessment
- □ Course completion and certification.
- □ Supervisor report and feedback.
- 🛛 ROI
- □ Other _____

3F. What specific programs/software are utilized in your company training?

3G. Do you plan on increasing or decreasing the use of this technology in the future?

- □ Increase
- Decrease
- □ Stay the Same