Augmented Reality: Enhancing the workforce

AP Seminar

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Augmented reality is taking the world by storm along with newer technologies such as robots, but using these technologies, the world is wanting to change/enhance the workforce without robots. Due to wanting to preserve the workforce keeping people in jobs, this would mean augmented reality should take the world by storm to strengthen our workforce without taking lower class people’s jobs by the use of robots. By focusing on neurological

Patterns, development of the patterns, consumer responses, store management, educational field research, along with various small topics we can enhance our workforce for all social classes.

By using augmented reality in the neurological field, we can preserve our society today by still allowing room for improvement. “One such technical approach is video see-through augmented reality (VST), which is based on the concept of seeing the world through cameras. Typical examples are mobile phone-based AR systems [101] and video see-through head-mounted displays (VST-HMD), which add external cameras to closed HMDs typically used in virtual reality (VR) [149] (Figure 1, left).” Yuta Itoh, et. al. (2021). This is some background talking about how the augmented reality can work. Neurologically your brain is going to match the images from the headset and allow them to seem real. The study by Krauze, L, et.al. (2021) elaborates on this by stating, “participants could successfully match the real objects and the augmented reality images in depth at close viewing distance.”  This study showed huge differences in the accuracy of the perceptual distance of objects in the displayed images from 45 cm to 115 cm. This describes how real-world scenarios augmented reality could accurately be used in the workforce. “Augmented reality (AR) enhances traditional learning resources that are difficult to obtain through real experience.” Damopolii, I., et.al (2022). This proves that augmented reality is already being applied in the classroom. The study by Damopolii, I., et.al (2022), also talks about how it is using this technology to improve students' critical thinking. Which is helpful in any neurological field. “Six of the seven studies (86%) regarding the efficacy of VR/AR/MR technologies in diagnosing ADHD found these technologies to be helpful. Similarly, eight of the nine studies (83%) assessing the ability of these technologies to manage ADHD symptoms found they were beneficial.” Goharinejad, S., et.al (2022). These statistics show the development and research of augmented reality combined with the use of AR to aid in ADHD are useful in reserving our job space instead of replacing it with robots. The percentages showing how helpful they are. The research done by Krugliak, A., & Clarke, A. (2022). shows “that combining whole-head mobile EEG and head-mounted AR is a feasible approach to studying cognitive processes in natural and dynamic environments, which could help open the door to studying a variety of cognitive factors in real environments, whilst also allowing for the control of visual aspects of those environments using AR.” This means using these technologies we can enhance workers’ cognitive process. With the research done AR has proved it has huge benefits for neurological development and research in those workforce fields. Although, due to limited technology today resolution on a display that is also transparent is lacking or not very bright. This could cause issues for pushing this technology out to jobs today. Especially if new technology comes out that puts the old displays out of date. Next in-depth look of augmented reality against consumers in the workforce.

Augmented reality is affecting stores and consumers who shop while still preserving their original shopping experience they also get a glimpse about what the future holds. In a test study participant were selected to participate in an augmented reality store because of COVID-19; these results by Schapsis, C., et.al., (2021) proves, “retailers better segment the market to target the right customers with the right products using AR applications to bring the consumer to a final purchase.” Which means this technology is allowing retailers help market to their best audience using AR which could help sales. “According to a report conducted by the United Nations Conference on Trade and Development (2020), the rapid growth in e-commerce caused by the COVID-19 pandemic boosted online retail sales’ proportion to overall retail sales from 16% to 19% in 2020. Furthermore, according to the most recent projections, worldwide e-commerce sales increased by 4% in 2019 to $26.7 trillion (The United Nations Conference on Trade and Development, 2020). Notably, due to quarantine limitations enforced in many countries, the pandemic caused an increase in the demand for online physical products.” Phuthong, T. (2022). These numbers can be monumental in the workforce. This is a great selling point. Rapid growth also means increase in revenue. This allows for more money to be put in the job force and help out the economy. “One prediction asserts the value the VR and AR market will be $108 billion USD by 2021, with AR taking an estimated $81 billion of the share [18].” Steffen, J. H., et. al. (2019). This shows statistically how drastic online sales are being used and how a digital technology like AR could renovate this space and bring online shopping to another level. “These findings provide converging evidence that AR is most effective when product-related uncertainty is high, demonstrating the technology’s potential to increase sales by reducing uncertainty and instilling purchase confidence.” Tan, Y.-C., et.al, (2022). That study proved there is a true way to increase sales which means while still preserving the shopping experience the added benefits of augmented reality will help out the workforce. “Augmented reality (AR) can provide a seamless interface that bridges the gap between the real and virtual world, so that the connections between users and the smart environment can be enhanced (Mourtzis, Vlachou, Zogopoulos, and Fotini 2017). A large number of successful AR systems have been rolled out to consumers, e.g. Hololens, Lowe’s targets store AR navigation, etc.” Wang, X., et. al, (2020). Since consumers have the money suppliers need it is crucial for suppliers to make this transition easy. Penco, L., et. al. (2021). “As AR experiences have become widely available on mobile devices, mobile AR (MAR) is important in providing many benefts to both smart consumers and suppliers/retailers, such as personal promotional tools (Woods 2009), consumer satisfaction, experiential value (Chou 2009), positive and immersive consumer-brand relationships (Owyang 2010).” These authors are saying because of the widespread integration it is providing benefits. Although there are many benefits in the shopping industry AR can be limited to local stores due to budget or lack on knowledge limitations, but this won’t prevent AR being deployed but can slow down mass deployment. Next, we will talk about deployment in the educational field.

AR can benefit heavily in the educational field. “Last but not least, augmented reality AR and VR virtual reality technologies are part of the category of emerging and disruptive technologies due to the possibilities of modeling-simulation of military actions and their management using instantaneous spatial and temporal landmarks, which could produce essential changes as a result of confrontations between combat forces. It is estimated that emerging and disruptive technologies are the product of specific transformations of the fourth industrial revolution, caused by the fusion of the third generation technologies (Martinelli, Mina & Moggi, 2021; Lee & Lee, 2021) and that they will influence the conduct of military confrontations, international security and implicitly international relations.” Virca, I., et. al. (2021). This is showing based on what augmented reality offers how it can benefit our military in the education. But this can go far beyond than just the military education. This can allow students to deepen their education as well. “This active engagement with a digital model, through AR technology, allows students to deepen their understanding of interconnected concepts and engage with the content in a modality beyond abstraction. Another benefit, as noted by Dunleavy, Dede, and Mitchell (2009), is that AR-enhanced pedagogy can parallel 21st century work. This is accomplished through a combination of factors. Use of AR technologies allows educators to create pedagogy where learning is authentic and similar to real-world experiences students may engage with outside of school. AR also allows educators to plan for the practice of problem finding and problem solving, key aspects of creative problem solving. Finally, students exercise metacognitive strategies for constructing meaning out of complex experiences. These facets of AR-enhanced education mimic themes that students will encounter in the workforce and that will make them more desirable to employers later in life.” Egresitz, J. (2022). This proves augmented reality has real world uses and can reflect in our modern world by prepping society for jobs. Which overall will help our workforce without massive change of robots pushing people out of jobs. Augmented reality in education is helping with preservation of our workforce because of those points drawn. But, there is still issues. The cost of deployment of these headsets can get expensive. If teachers used an AR app then they would have to worry about other distractions on kids smartphones. But as the technology grows the price should become to a reasonable level for high quality AR.

Dominating this industry today is augmented reality on mobile. Bermejo, C. et. al (2021), elaborates on this by stating “The mobile nature of MAR applications makes sense for AR applications so people can experience them anywhere, such as museums (information), malls (shops ads), and streets (directions). Mobile devices such as smartphones can provide MAR applications a powerful, less expensive, and rapid adoption platform [38].” Since mobile AR can easily have widespread adoption due to mobile phones this makes it easier to release for the public. “In addition, in 2019 Internet of Elephants released the mobile app game ‘Wildeverse: A Wildlife AR Game’, or ‘Wildeverse’ (https://www.internetofelephants.com/wildeverse), which aims to educate players about the threats faced by great apes using augmented reality (AR) technology.” Dunn, M. E., et. al. (2021).  This is beneficial for an environmental impact. This app was a prime example of this. The AR industry is already strong in the workforce of game designers. Mobile AR is easy to deploy, but due to the limitations of a mobile cell phone this can limit some AR abilities. As spoken before some high-tech simulations in AR cannot run on a mobile phone.

All in all, using the points above the evidence given is effective. The evidence ties back into why augmented reality is most beneficial for enhancement in our workforce over robots. With the power of augmented reality in many elements of the workforce to education and to the shopping industry it will be revolutionary. But with all the power it holds it does have drawbacks. Cost and mass adoption is the biggest ones. But, as time goes on manufacturers will find ways to lower cost and slowly more and more people will adopt this technology. Which is what the evidence provided above says in predictions and current workforces prove.

**References**

Bermejo, C., & Pan Hui. (2021). A Survey on Haptic Technologies for Mobile Augmented Reality. *ACM Computing Surveys*, *9*, 1–35. https://doi.org/10.1145/3465396

Damopolii, I., Paiki, F. F., & Nunaki, J. H. (2022). The Development of Comic Book as Marker of Augmented Reality to Raise Students’ Critical Thinking. *TEM Journal*, *11*(1), 348–355. https://doi.org/10.18421/TEM111-44

Dunn, M. E., Shah, G., & Veríssimo, D. (2021). Stepping into the Wildeverse: Evaluating the impact of augmented reality mobile gaming on pro‐conservation behaviours. *People & Nature*, *3*(6), 1205–1217. https://doi.org/10.1002/pan3.10273

Egresitz, J. (2022). Science fiction no longer: and the technology engineering education classroom augmented reality. *Technology & Engineering Teacher*, *81*(5), 16–21.

Goharinejad, S., Goharinejad, S., Hajesmaeel-Gohari, S., & Bahaadinbeigy, K. (2022). The usefulness of virtual, augmented, and mixed reality technologies in the diagnosis and treatment of attention deficit hyperactivity disorder in children: an overview of relevant studies. *BMC Psychiatry*, *22*(1), 1–13. https://doi.org/10.1186/s12888-021-03632-1

Krauze, L., Pladere, T., Zabels, R., Smukulis, R., Barkovska, V., Konosonoka, V., Musayev, I., Svede, A., & Krumina, G. (2021). Comparative assessment of spatial perception in augmented reality depending on the consistency of depth cues. *Proceedings of the Estonian Academy of Sciences*, *70*, 326–332. https://doi.org/10.3176/proc.2021.4S.03

Krugliak, A., & Clarke, A. (2022). Towards real-world neuroscience using mobile EEG and augmented reality. *Scientific Reports*, *12*(1), 1–11. https://doi.org/10.1038/s41598-022-06296-3

Penco, L., Serravalle, F., Profumo, G., & Viassone, M. (2021). Mobile augmented reality as an internationalization tool in the “Made In Italy” food and beverage industry. *Journal of Management & Governance*, *25*(4), 1179–1209. https://doi.org/10.1007/s10997-020-09526-w

Phuthong, T. (2022). Use of Augmented Reality-Based Applications in Online Retailing and Customer Engagement: An Empirical Investigation in the Context of the Emerging Economy of Thailand. *Journal of Management Information & Decision Sciences*, *25*, 1–19.

Schapsis, C., Chiagouris, L., & Pham, N. C. (2021). Are Consumers Ready for Augmented Reality? Factors Influencing Online Footwear Purchasing Intentions Using AR Technology. *Journal of Marketing Development & Competitiveness*, *15*(2), 21–36. https://doi.org/10.33423/jmdc.v15i2.4331

Steffen, J. H., Gaskin, J. E., Meservy, T. O., Jenkins, J. L., & Wolman, I. (2019). Framework of Affordances for Virtual Reality and Augmented Reality. *Journal of Management Information Systems*, *36*(3), 683–729. https://doi.org/10.1080/07421222.2019.1628877

Tan, Y.-C., Chandukala, S. R., & Reddy, S. K. (2022). Augmented Reality in Retail and Its Impact on Sales. *Journal of Marketing*, *86*(1), 48–66. https://doi.org/10.1177/0022242921995449

Virca, I., Barsan, G., Oancea, R., & Vesa, C. (2021). Applications of Augmented Reality Technology in the Military Educational Field. *Revista Academiei Fortelor Terestre*, *26*(4), 337–347. https://doi.org/10.2478/raft-2021-0044

Wang, X., Yew, A. W. W., Ong, S. K., & Nee, A. Y. C. (2020). Enhancing smart shop floor management with ubiquitous augmented reality. *International Journal of Production Research*, *58*(8), 2352–2367. https://doi.org/10.1080/00207543.2019.1629667

Yuta Itoh, Langlotz, T., Sutton, J., & Plopski, A. (2021). Towards Indistinguishable Augmented Reality: A Survey on Optical See-through Head-mounted Displays. *ACM Computing Surveys*, *54*(6), 1–36. https://doi.org/10.1145/3453157