



# Exploring the Use of Mobile Augmented Reality as Performance Support

*Sydney Tankins, Yao Huang*

*Department of Educational Psychology and Learning Systems  
Florida State University*

## Introduction

Performance support within the workforce focuses on the application of skills and learning into the completion of given tasks. Training methods are often offered as a solution to increasing employee knowledgeability, however, they are more costly and less effective in present workplace environments. This research project focuses on the presence of mobile Augmented Reality (AR) technology to provide performance support within current North American and European organizations, reporting the methods of adaptations used to effectively increase problems related to performance support, as well as reach long-term goals within the company. Performance support research utilizing new technological innovations allows for workplace problem solving and productivity to progress and adapt to the current world. As opposed to implementing mobile AR in new environments, this study conducts interviews with successful companies to propose a model of adaptation for future workplaces to follow in order to allow for optimal performance support solutions to be offered to employees. Despite having little knowledge on the topic, I chose to participate in this study to offer more research on an overlooked area of the workplace, as well as on the overall topic of mobile AR. The preliminary findings indicated that organizations implement mobile AR for performance support through visual information systems and handheld devices, aiming to aid in sectors of manufacturing and industry at higher rates than other areas of work.

## Methods

The methods used in the study include semi-structured interviews with a range of 3 to 6 participants from an American multinational consumer products company, a utility company, and the largest industrial manufacturing company in Europe directly involved with matters of performance support. Purposeful sampling was used to acquire participants, and the sample was given consent forms and a cover letter in advance. The interview instrument was constructed to include broad questions regarding the implementation of mobile AR technology in the workplace to increase performance support, and a pilot test was conducted to evaluate the instrument. Interviews were conducted over Zoom, and the hour-long discussion was recorded to allow for transcription of each participants' answers to be transcribed for analysis. The data analysis utilized included thematic analysis of the answers provided to be evaluated in terms of patterns and trends found in mobile AR implementation to create a general model for future organizations to utilize.

## Results

While completing the processes of collecting and analyzing data, the past research and the data collected indicate a possible trend of increased prevalence of mobile AR systems throughout companies for performance support purposes including information retrieval, procedural guidelines, decision making support, contextual feedback and interaction, location identification, information authoring, and communication with experts. Implementing tracking methods based upon markers is the suggested tracking method that is most implemented when adopting mobile AR, and the fields of manufacturing, maintenance and assembly are shown to adopt mobile AR systems more frequently than other fields of applications. The use of mobile AR has been shown to be implemented for instructional support and navigation at higher rates, and the benefits related to performance support focus upon efficiency and generating solutions. Relevant to the question of the way in which companies and organizations adopt mobile Augmented Reality for performance support, the data reported indicates that the process is centered around the desired outcomes, later informing the necessary devices and software necessary to achieve each goal, as well as the content programmed into the AR technology.

Performance Support Purposes	Fields of Adoption	Tracking Methods	Mobile Devices	Perceived Benefits
Information Retrieval	Manufacturing	Marker-Based Tracking Methods	Hand-held Devices (HHDs)	Decreased Training Costs
Procedural Guidelines	Maintenance		Head-Mounted Devices (HMDs)	Increased Efficiency in Tasks
Decision-Making Support	Assembly		Screens/Monitors	Increased Accuracy
Contextual Feedback/Interaction				
Location Identification/Navigation				
Information Authoring				
Communication with Field Experts				

*Table 1.* The results of the interviews and past literature illustrate the preferred performance support performances amongst companies, as well as the industry within which AR is commonly adopted. The tracking methods and preferred mobile devices are outlined, and the perceived benefits of implementing mobile AR regarding performance support have been included.

## Conclusions

The research conducted provides important contributions in establishing a model of mobile AR adoption for performance support. The data collected from interviews indicate key benefits of mobile AR adoption including increased efficiency and accuracy in completing tasks, as well as more effective instructional support and feedback. Furthermore, the preferred devices for maximized performance support were shown to be head-mounted devices (HMDs) and hand-held devices (HHDs) alongside programming that is based on real-time location and feedback, allowing future organizations to have an understanding of the most successful adoption methods. The future of research should involve current innovations in AR technology to explore the possible performance support benefits with newer technology. A larger sample of participants, as well as exploring the technology first-hand, may provide more detailed data in future research.

## References

- [1] Carmignani, J., Furht, B., Anisetti, M., Ceravolo, P., Damiani, E., & Ivkovic, M. (2011). Augmented reality technologies, systems and applications. *Multimedia Tools and Applications*, 51(1), 341–377. <https://doi.org/10.1007/s11042-010-0660-6>
- [2] Funk, M., Bächler, A., Bächler, L., Kosch, T., Heidenreich, T., & Schmidt, A. (2017). Working with Augmented Reality?: A Long-Term Analysis of In-Situ Instructions at the Assembly
- [3] Hou, L., & Wang, X. (2013). A study on the benefits of augmented reality in retaining working memory in assembly tasks: A focus on differences in gender. *Automation in Construction*, 32, 38–45. <https://doi.org/10.1016/j.autcon.2012.12.007>
- [4] Martinetti, A., Rajabalinejad, M., & van Dongen, L. (2017). Shaping the Future Maintenance Operations: Reflections on the Adoptions of Augmented Reality Through Problems and Opportunities. *Procedia CIRP*, 59, 14–17. <https://doi.org/10.1016/j.procir.2016.10.130>