

ITU KALEIDOSCOPE

ONLINE**2020**

7-11 December 2020

**Immersive Technologies For
Development: An Analysis
Of Agriculture**



Ofentse Mabiletsa

Department of Computer Science,
University of the Western Cape

**Session 6: Immersive technologies in
farming**

Paper S6.1



Outline

- Background
- Immersive Technology in Agriculture
- Overview of Selected Articles
- Analysis and Discussion
- References
- Acknowledgements

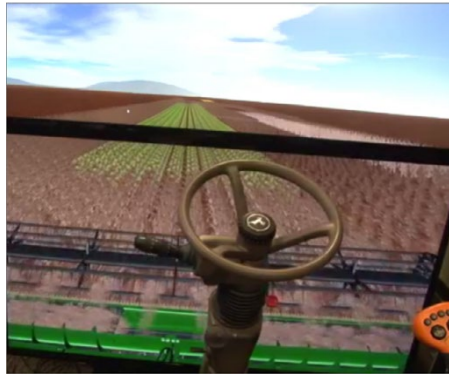
Introduction

- Agricultural development key to economic development.
- Immersive technology in Agriculture – limited academic works done
- Work presents overview of immersive technology, and evaluates objectives:
 - How is immersive technology embedded ?
 - What technologies and principles applied ?
 - What evaluation methods are considered?



Trend of Immersive Technologies in Agriculture

- Agricultural Education and Training (Sulyman-Haroon, 2018; Mabiletsa *et al.*, 2019)
- Health and Safety on Farm Machinery (Gonzalez *et al.*, 2017; Meusel *et al.*, 2019)
- Agritourism and Virtual Tours (Garzón *et al.*, 2018; Yang *et al.*, 2019; Kim *et al.*, 2019)
- Diseases and Pest Management (Huuskonen *et al.*, 2018; Nigam *et al.*, 2020)
- Livestock and Crop Tracking (Katsaros *et al.*, 2017; Rudowicz *et al.*, 2018)
- Farm Marketing (Torrico *et al.*, 2020)

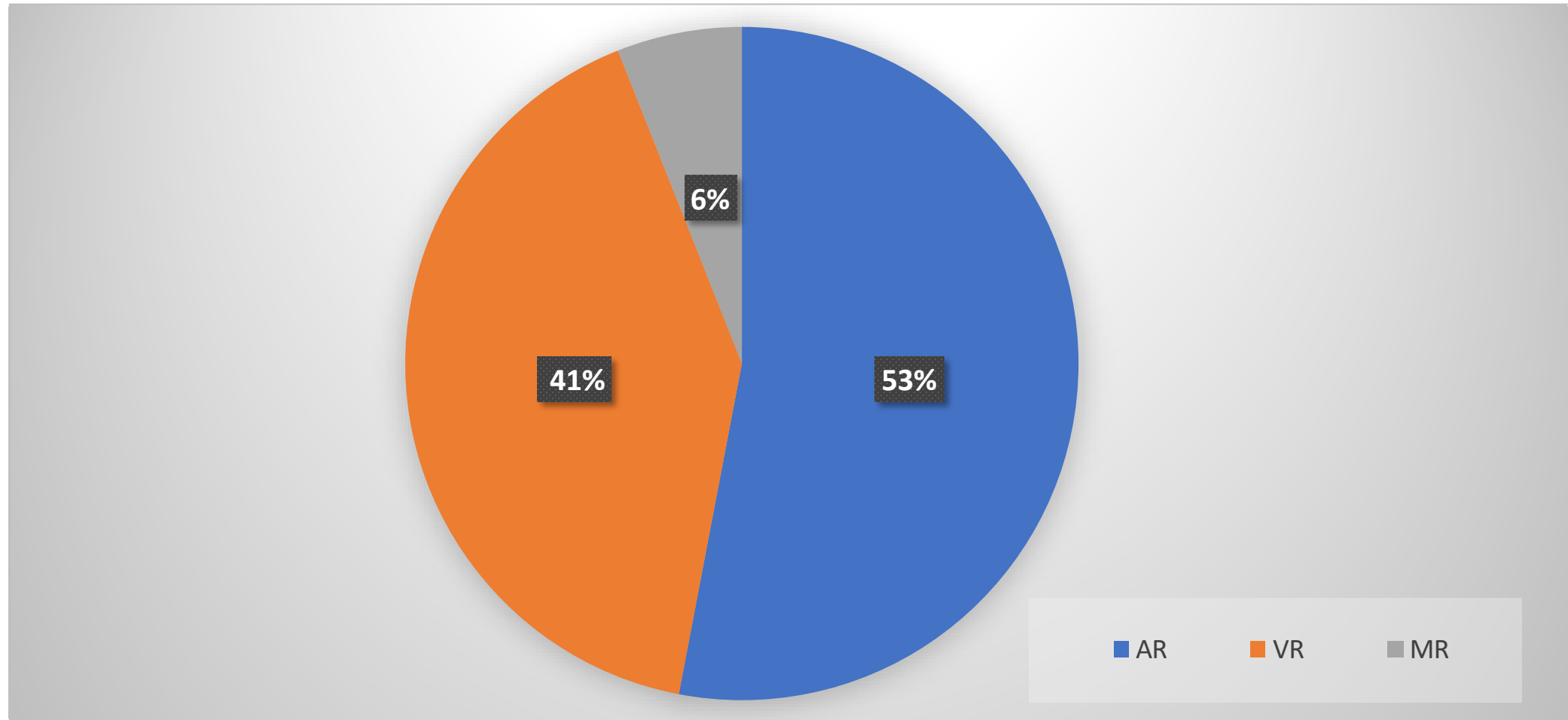


Overview of Selected Articles

- Inclusion/exclusion criteria:
 - Studies related to the research questions;
 - Studies mostly published in last 5 years (2015-2020);
 - Studies that can be found in scholarly databases;
 - Articles must use some type of immersive technology.

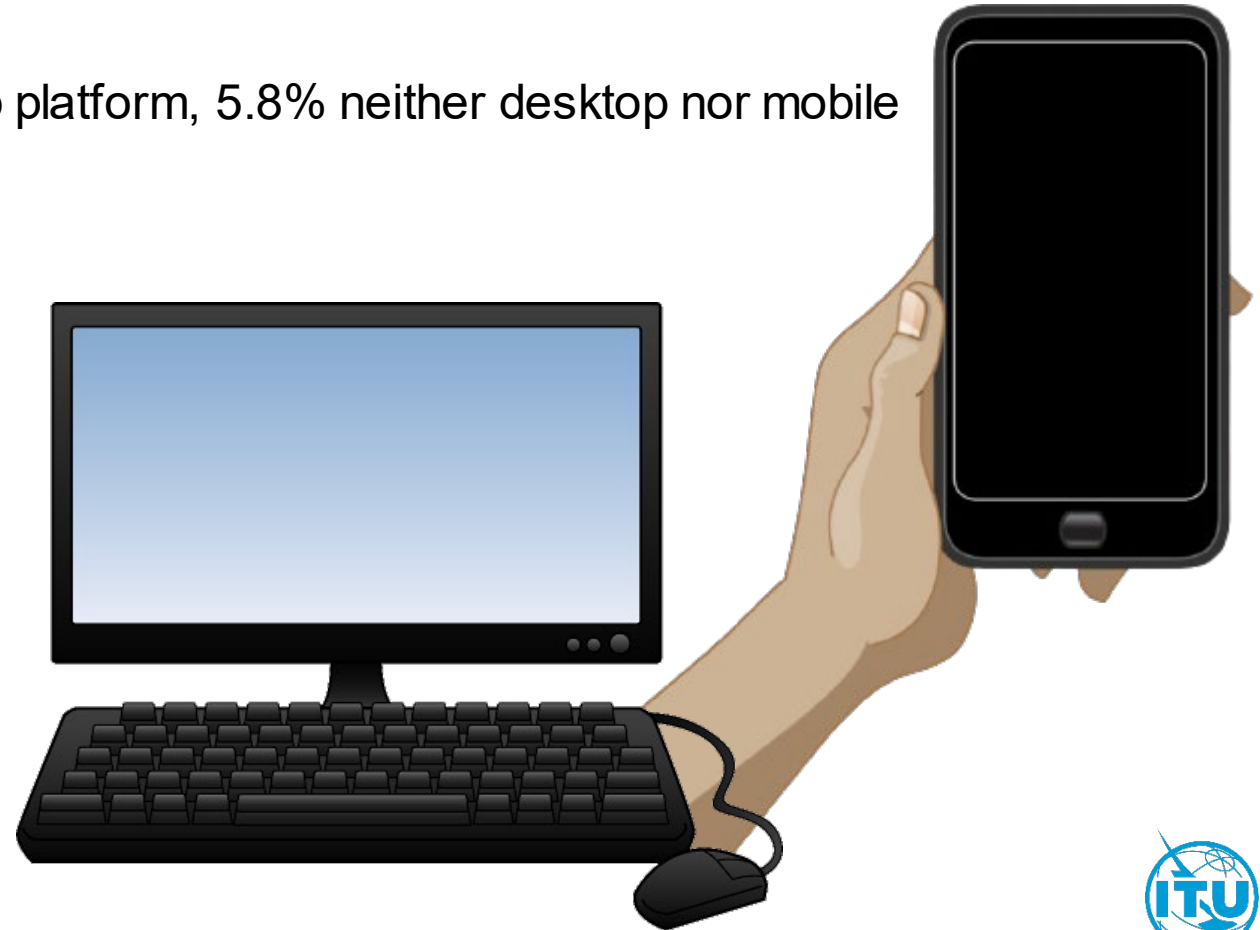


Analysis of Immersive Technology in Agriculture



Analysis and Discussion

- 53% used AR, 41% used VR 6% used MR.
- 47.05% -mobile platform, 47.05% - desktop platform, 5.8% neither desktop nor mobile platforms.
- 35.5% used qualitative evaluation
- Only 11.8% solutions deployed in real life.
- 88% conducted outside Africa



Summary and Conclusion

- Immersive technologies have the potential to support smart agriculture for increased productivity.
- Little achievement in deployment of the technology in the agriculture sector in Africa
- Analysis shows gap in literature, reporting on advancements made in applying immersive technology to agricultural processes.
- Limited real-life deployment of solutions
- Analysis will inform and guide future research in the applications of immersive technology to agriculture.

References

- Nigam, P. Kabra, and P. Doke. 'Augmented Reality in Agriculture', International Conference on Wireless and Mobile Computing, Networking and Communications, pp. 445-448. DOI: 10.1109/WiMOB.2011.6085361. 2020.
- Haroon S.O and Abdulrauf T.: A Virtual Reality Prototype for Learning Maize Planting. *Journal Communications on Applied Electronics* 2(1): pp. 10-14, 2015.
- O. Mabiletsa, S. J. Viljoen, J. A. Farrell, L. Ngqwemla, and O. E. Isafiade, "An Immersive Tractor Application for Sustainability," *Int. J. Virtual Augment. Real.*, vol. 4, no. 1, pp. 35–54, IGI Global, USA, 2020.
- O. Gonzalez, B. Martin-Gorriz, I. Ibarra, A. Macian, G. Adolfo and B. Miguel: Development and assessment of a tractor driving simulator with immersive virtual reality for training to avoid occupational hazards', *Computers and Electronics in Agriculture*. Elsevier, 143(September), doi: 10.1016/j.compag.2017.10.008. pp. 111–118, 2017
- J. Rudowicz-Nawrocka, k. Kudlińska, G. Niedbała and M. Piekutowska: Application of augmented reality in dairy cattle monitoring, *Applied Researches in Technics, Technologies and Education*, 6(1), doi: 10.15547/artte.2018.01.001. pp. 1–9, 2018.
- D. Torrico, Y. Han, C. Sharma, S. Fuentes, C. Gonzalez, and F. Dunshea: Effects of Context and Virtual Reality Environments on the Wine Tasting Experience, Acceptability, and Emotional Responses of Consumers. In *MDPI Foods* (Basel, Switzerland). 10.3390/foods9020191, pp. 1-17, 2020
- Y. Yang, Y. Fan, and R. Sun 'A Human-Computer Interaction System for Agricultural Tools Museum Based on Virtual Reality Technology', *Advances in Multimedia*. doi: 10.1155/2019/2659313. pp. 1-15, 2019.

Acknowledgements



UNIVERSITY *of the*
WESTERN CAPE



ITU KALEIDOSCOPE

ONLINE 2020

Thank you!

