

Program Level Assessment: Annual Report

Program Name (no acronym)	Master's in Aviation	Department	Oliver L. Parks Department of Aviation
		College/School	School of Science and Engineering
Date (Month/Year)	June 2022	Assessment Contact	Stephen G. Magoc
In what year was the data upon which this report is based?	June 2022	Assessment Cycle	Spring 2022
In what year was the data last reviewed/updated?	June 2022		
Is this program accredited by an external program/disciplinary/specialized accrediting organization?	No		

1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment? (Please list the full, complete learning outcome statements and not just numbers, e.g., Outcomes 1 and 2.)

Student Learning Outcome 1: Apply mathematics, science, and applied sciences at a level appropriate to aviation.

learning outcome requirements. These courses were taught only in an online modality so there is no difference in achievement to note.

5. Findings Interpretation & Conclusions

What have you learned from these results? What does the data tell you?

The data tells the faculty of the department that its graduates are able to apply mathematics, science, and applied sciences at a level appropriate to aviation disciplines at the master's level, including an adequate foundation in statistics.

6. Closing the Loop: Dissemination and Use of Current Assessment Findings

A. When and how did your program faculty share and discuss these findings from this cycle of assessment?

All faculty in the department met on 06/23/2022 to assess the student learning outcome, therefore faculty are aware of the results and findings of this assessment cycle.

B. How specifically have you decided to use findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies

- Course content
- Teaching techniques
- Improvements in technology
- Prerequisites

- Course sequence
- New courses
- Deletion of courses
- Changes in frequency or scheduling of course offerings

Changes to the Assessment Plan

Department of Aviation Science

Assessment of M.S. in Aviation Student Learning Outcomes

Student Learning Outcome #1: Apply mathematics, science, and applied sciences at a level appropriate to aviation- related disciplines at the master’s level, including an adequate foundation in statistics.

Performance Indicator Assessed	Do not Meet	Meet	Date of this
Students and graduates develop preliminary skills in statistics needed to conduct research in aviation.		X	
Students and graduates discuss the fundamental underpinnings of both qualitative and quantitative research methods.		X	

assessment:

The following assessment is based on prior coursework of students and graduates and surveys of graduates.

List any prior change(s) made to the curriculum to aid students and graduates in meeting this student learning outcome: Faculty of the department developed more-explicit instructions for discussion board accountability.

Describe the effect of any change(s) made to the curriculum: The faculty of the department determined that due to the more-explicit discussion board instructions, the students were better able to complete assignments and interact with fellow students more efficiently.

List recommendation(s) for changes to be made to the curriculum as a result of this assessment: See the following table.

Department of Aviation Science
Graduate Program Assessment M.S. in Aviation
Continuous Improvement Items
06232022

Course	Student Learning Outcome	Action Item
ASCI 5010 Introduction to Aviation Research Methods	SLO #1 Apply mathematics, science, and applied sciences at a level appropriate to aviation-related disciplines at the master's level, including an adequate foundation in statistics.	

Graduate Course Performance Indicator Rubric

Assess Student Learning Outcomes

Course: ASCI 5010 Introduction to Aviation Research Methods Instructor: Terrence Kelly

Semester Taught: Fall 2021 Number of Students in Course: 3

Student Learning Outcome Assessed	Assessment Results: (Indicate what % of class achieved a minimum score of 80%)	Benchmark achieved? (Benchmark: 80% of students will score a minimum of 80% = "B")
SLO 1: Assess relevant literature or scholarly contributions to the aviation field of study.	<p style="text-align: center;"><u>Precis Average Scores</u></p> <p style="text-align: center;">Precis LM2: 91.0%</p> <p style="text-align: center;">Precis LM4: 95.6%</p> <p style="text-align: center;">Precis LM6: 89.3%</p> <p style="text-align: center;">Precis LM8: 90.0%</p>	Yes, 3 of 3 100%

Assignment Average Scores

SLO 2: Apply the major practices, theories, or research methodologies in the aviation field of study.	<p style="text-align: center;">Thesis Statement: 95%</p> <p style="text-align: center;">Problem Statement: 92%</p> <p style="text-align: center;">Source List: 100%</p> <p style="text-align: center;">MiniLit Review: 90%</p> <p style="text-align: center;">Research Questions: 93%</p>	Yes, 3 of 3 100%
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ethical committee (EC), what the approval process looks like for this committee once it is setup, and how this EC should provide education to further culture.

References

- Shivadas, S., Dlabolová, D. H., Veronika, K., & Khan, Z. R. (2021). Assisting you to advance with ethics in research ethical production and application procedures. *International Journal for Educational Integrity*, 17(1) <http://dx.doi.org/10.1007/s40979-021-00078-4>
- Israel, M., & Drenth, P. (2016). Research integrity: perspectives from Australia and New Zealand. In T. Brusa (Ed.), *Handbook of academic integrity* (pp. 88-99). Springer, Singapore. <https://doi.org/10.1007/978-98-098-64>
- Singapore statement on research integrity (2010). 3rd World Conference on Research Integrity. <https://wcrif.org/standards/singapore>
- Fox G (2017). History and ethical principles. The University of Miami and the Collaborative Institutional Training Initiative (<https://silo.tips/download/chart-history-and-ethical-principles#>)
- Kuyare, MS., Taur, SR., Thatte, U. (2014). Establishing institutional ethics committees: challenges and solutions: a review of the literature. *Indian J Med Ethics* <https://doi.org/10.529/IJME.2014.047>
- Quinn, M. (2011). *Introduction to Ethics for an Information Age*. 4th Ed. 102. Pearson. UK
- Texts of the Council of Europe on bioethical matters (n.d.). Retrieved December 11, 2021, from [https://www.coe.int/t/dg3/bioethic/texts_and_documents/INF_2014_5_vol_II_textes_%20CoE_%20bio%C3%A9thique_E%20\(2\).pdf](https://www.coe.int/t/dg3/bioethic/texts_and_documents/INF_2014_5_vol_II_textes_%20CoE_%20bio%C3%A9thique_E%20(2).pdf)

Examples SLO 2

Thesis Statement Example 1

Using the guidance provided in LM 3 (Videos and Purdue Owl), upload an example Thesis statement for a research topic related to your research. This item is due no later than Friday, September 24th by 6:00pm (central time).

Aviation is an extremely expensive and complex industry with high potential for safety incidents, leading experts to advocate for lowering costs, increase quality of training, and minimize risk. Visual and augmented reality in aviation training simulation has begun to fill that need for, as there have been proven studies on its ability to immerse the pilot in a more realistic environment and help improve. However, as this research will show, when the complexity of the aviation task at hand increases significantly there is a point at which simulation instead of the aircraft can in effect hamper pilot learning and proficiency.

virtual and augmented reality training should occur in the early phase of training but taper down in more advanced training, as its benefit diminishes significantly when compared to the learning that happens when flying.

*note: I used the guidance from your video that discussed thesis statements, as opposed to the Purdue guidance which made it seem more like a sentence.

Thesis Statement Example 2

Previous aircrafts' accidents and incidents investigation findings should be the lieu to commence in the identification and reporting process for MROs and Line Maintenance providers:

The paper that follows should

Explain how relying on previous findings of aircrafts' accidents and incidents investigation could increase the hazards identification and reporting for MROs and Line Maintenance for their SMS program.

Problem Statement Example 1

The advances of virtual and augmented reality in aviation simulation (e)-3 (i)10.6 (m)-6(s)-1.3 (o)-6.6 scientificMC /-1.3 (h)13.1 th.98 0 (o)-6

Carmigniani, J., Furht, B., Anisetti, M., Ceravolo, P., Damiani, E., & Ivkovic, M. (2011). Augmented reality technologies in Multimedia Tools and Applications, TT1 1 T -0.001 Tc -0. an()15.9 (1)-2.9),Tls1T T 1 /TT1 -2 5deB0 Tc l(30)2.3 (. i3.5 (77.(1)-g 126.72 MCID 4 -/Link>>BDC (

Kaplan, A. D., Cruik, J., Eys, M., Beers, S. M., Sawyer, B. D., & Hancock, P. A. (2021). The Effects of Virtual Reality, Augmented Reality, and Mixed Reality Training Enhancement Methods: A Meta-Analysis. *Human Factors, 63*(4), 766. <https://doi.org/10.1177/0018720820904229>

- Goyal, R., Reiche, C., Fernando, C., & Cohen, A. (2021). Advanced air mobility: Demand analysis and market potential of the airport shuttle and Air Sustainability, 13(13), 7421. <https://doi.org/10.3390/su13137421>
- Hinkelbein, J. (2010). Helicopter Emergency Medical Services accident rates in different International Air Rescue Systems. *Emergency Medicine*, 45. <https://doi.org/10.2147/oaem.s9120>
- Mitchell, S. J., & Braithwaite, G. R. (2008). Perceptions of Offshore Helicopter Travel. *International Journal of Energy Sector Management*, 2(4), 498. <https://doi.org/10.1108/17506220810919036>
- Moon, K., & Yakovlev, A. A. (2020). A comparative statistical analysis of global trends in helicopter accidents in the U.S., the EU, and the CIS. *IOP Conference Series: Materials Science and Engineering*, 868, 012020. doi:10.1088/1757-1022/868/1/012020
- Nascimento, F. A. C., Majumdar, A., & Ochieng, W. Y. (2013). Helicopter accident analysis. *Journal of Navigation*, 67(1), 145. <https://doi.org/10.1017/s037346331300057x>
- Nystøyl, D. S., Breidablik, H. J., Røislien, J., Hunskaar, S., Østerås, Ø., & Zakariassen, E. (2018). 44 emergency medical service influence on the use of Helicopter Emergency Medical Service? an observational study of a natural experiment. *Abstracts*. <https://doi.org/10.1136/bmjopen-2018-025144>
- Peters, A. G., & Wood, D. F. (1977). Helicopter Airlines in the United States. *The Journal of Transport History*, 4(1), 1-16. <https://doi.org/10.1177/002252667700400101>
- Qian, F., Gribkovskaia, I., & Halskau Sr, Ø. (2011). Helicopter routing in the Norwegian Oil Industry. *International Journal of Physical Distribution & Logistics Management*, 41(4), 401-415. <https://doi.org/10.1108/09600031111131959>
- Saleh, J. H., Tikayat Ray, A., Zhang, K. S., & Churchwell, J. S. (2019). Maintenance and inspection as risk factors: Analysis and recommendations. *PLOS ONE*, 14(2). <https://doi.org/10.1371/journal.pone.0211424>

Scaperdas, A., & Howson, D. (2020). CAA Research Project Helicopter Operations to Moving Offshore Helidecks. *The Aeronautical Journal*, 124(1280), 1494. doi:10.1017/aer.2020.29

The European Helicopter Safety Team Releases Preliminary Analysis Results. (2009). *Aircraft Engineering and Aerospace Technology* <https://doi.org/10.1108/aeat.2009.12781eab.016>

Velazquez, J., & Bier, N. (2015). SMS and CRM: Parallels and opposites in their evolution. *Journal of Aviation/Airspace Education* <https://doi.org/10.15394/jaaer.2015.1616>

V. Krivolutsky. (2020). Development of a promising area of diversification in Helicopter Industry. *THE JOURNAL* <https://doi.org/10.18421/24194>

Yamada, N., Kitagawa, Y., Yoshida, T., Nachi, S., Okada, H., & Ogura, S. (2021). Validity and risk factor analysis for helicopter emergency medical service pilot study. *BMC Emergency Medicine*, 21(1). <https://doi.org/10.1186/s12873-021-00473-1>

Yan, X., Lou, B., Xie, A., Chen, L., & Zhang, D. (2021). A review of aerodynamic high speed aircraft. *IOP Conference Series: Materials Science and Engineering*, 1102(1)012006. <https://doi.org/10.1088/1757-1022/1102/1/012006>

One of the challenges for this research will be to gain permission and have access to the data required to effectively accomplish the proposed study. However, I have previously successfully completed a study comparing two classes of pilot training for a Master's level research project related to a flight simulator to aid in GPS proficiency in the ATIS II. During this research specific data was collected and analyzed with a quantitative design. The purpose is to compare one class of around 25 students of UPT 2.5, which incorporates AR/VR, with a class of similar size that completes training the traditional way with no use of AR/VR. I am not sure if this will be able to produce statistically significant results with this sample size, and will need to do more to determine this. Examples of data collected will be safety incident and accident trend information, along with specific flight and check ride data, and the number of simulator and flight hours will be compared as well.

Additionally, as this research will try to uncover a given reality in comparing two pilot training methods and as objectively as possible, this ties into quantitative research as the ideal method (Sukamolson, 2003). Research will be accomplished via the testing of a hypothesis which attempts to explain at what point students training via augmented and virtual reality versus flight is often the best fit. The hypothesis to test and prove is that AR/VR remains the best fit for pilot training.

One method that will likely be utilized is surveying the instructor pilots who have experience in both traditional and 2.5 pilot training to get their professional opinions on the incorporation of AR/VR into the training. According to Creswell in Table 1.4, these surveys can be done in a manner to produce quantitative results by using closed questions (2020), or use of a Likert Scale to attribute numerical value to a response.

Existing Studies

While not numerous, there are a few existing studies that research AR or VR as it relates to aviation. One paper that researches a remote pilot using VR glasses uses an observational study method (Coleman & Thirtyacre, 2021). Another study conducted at a University concerning VR in flight training used a quantitative research method with a cross-sectional survey design (Fussell, 2020). In a different but related field, Sportillo et. al. researched automated driving using VR to study response times using experimental procedures (2018). All of these studies, plus a few additional ones that were not mentioned, used quantitative design to conduct their research.

Conclusion

There is potentially a way to perform this research with a qualitative design, but as presented, there is overwhelming support for approaching it with a quantitative design. This will allow concrete and specific data sets to be gathered and analyzed to produce statistically significant results and show that AR/VR is not a substitute for flying in Undergraduate Pilot Training, but only up to a certain point, after which it can become a

References

Creswell, John W., Creswell, J. David, (2020) Research Design: qualitative, quantitative, and mixed methods approaches SAGE Publications, Inc.

Coleman, J., & Thirtyacre, D. (2021). RTD [(i),>>BD76 (x)-4.8 (e)4.90.7 (RT3 (p)2.8 (il)10.6 (o)-6.3 (t)-3 ()10. (s)-1.3(it)7.u(d)2.3 (at)-2.96

human factors, human factors systems, and aviation medicine (Constantin et al., 2012). However, great deal of researchers believes that using methodology in the aviation field has some drawbacks such as separation of the human element from the rest of the system. Employing quantitative research in aviation field provides some benefits: specific, objective, rational analysis, simple to document, and it's useful for modeling while qualitative research in aviation safety has some advantages, such as connecting and comparing unrelated data, and quantifying the value of quantitative data, and narrowing the range of possible safety judgments (Britton, 2017). Many researchers believe that qualitative research is more rigorous than quantitative research, and it is more likely to produce concrete results in the aviation field (Deaton, 2019). Qualitative research, or even mixed studies, could give new aspects to aviation research that is now being conducted (Deaton, 2019). Much of the field of aviation, like other disciplines, is based on participants' subjective answers, so what we consider "objective" may not be so (Deaton, 2019).

"Psychology in general has accepted the viewpoint that qualitative research is as valid as quantitative; however, I think aviation research is recognizing the value of qualitative data" (Deaton, 2019, para. 5). The realization of this necessity drives qualitative research approaches in the aviation industry. Since qualitative research can study complex phenomena that are quantitative research and can achieve the characteristics of complex behaviors and relationships, so more qualitative research methods are needed to support it (Constantin et al., 2012). researcher uses the observation of communication, and activity within a closed group of individuals in the qualitative study, and the results of the model's research present the cultural description, this concept is effective particularly in the aviation industry (Constantin et al., 2012) in aviation, such as flight crews, air traffic controllers, and engineers, form independent professional teams in the aviation industry, but they need a symbiotic relationship to meet operational requirements, hence the need for a qualitative study to interpret the human behavior along with (Constantin et al., 2012). Not only is the aviation world an 'evolved construct,' but the data collection methods themselves, narratives, Aviation safety reports, accident reports, etc., are usually unrestricted in format, so they are qualitative in nature (Deaton, 2019). Observational studies on human performance, particularly in aviation topics, frequently use hybrid approaches, in which the research topic is grounded in quantitative data, t

on quantitative method, and the results are presented in a quantifiable way; However, careful study of the data raises questions about the method used, and the results usually a numerical description of the qualitative process. This process often reduces the narrative to a plain number et al., 2012). Why is The Quantitative Research More Suitable for Aviation Field? The quantitative method is suitable for research because the majority of aviation research is focused on the improvement of aviation safety. Hence, most researchers prefer to conduct their research from a standpoint due to the need for statistically driven measures by regulators and prudential authorities and a perceived requirement for findings (Constantin et al., 2012). Quantitative research aims for results that are free of subjective interpretation because of these facts the quantitative method has become a prevalent and desirable research methodology in a wide range of disciplines, particularly where support organizational, governmental policy or capital investment (Constantin et al., 2012). For quantitative research has dominated fields like physics and mathematics, and its influence even has spread to the medicine, psychology, and aviation science due to the mathematics and physics. Historically, most organizational research, especially in aviation, is considered quantifiable in nature; this is why it is mostly conducted using a positivistic methodology (Constantin et al., 2012).

Conclusion Quantitative research in aviation is the dominant due to the aviation field and its reliance on the natural and technical sciences. The research in the aviation field is typical of most disciplines, in these disciplines, the progress of research results is defined by substantial initial findings followed by slightly insignificant improvements to existing knowledge (Wiggins & Stevens, 2016). The research questions determine the research method. Quantitative research is characterized by the use of numerical data and statistical analysis to test hypotheses and identify patterns. Quantitative research is typically used in fields where the variables are measurable and the relationships between variables are expected to be causal. Quantitative research is often used in fields like physics, mathematics, psychology, and aviation science. Quantitative research is characterized by the use of numerical data and statistical analysis to test hypotheses and identify patterns. Quantitative research is typically used in fields where the variables are measurable and the relationships between variables are expected to be causal. Quantitative research is often used in fields like physics, mathematics, psychology, and aviation science.

Qualitative

1. Do instructors who have experience in both traditional and Pilot Training Next 2.5 describe a perceived benefit of increased use of Augmented and Virtual Reality while simultaneously decreasing the flight hours a student pilot receives?
2. What are the main factors associated with transitioning to relying more on augmented and virtual reality than on flying during pilot training?