Pilot Training Videos Enhance Student Pilot Training:
A Diamond DA-40 Student Pilot Flight Maneuvers Interactive Video Series

by
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Abstract

Middle Tennessee State University's (MTSU) 14 CFR Part 141 flight training program currently uses many varying training aids to train pilots. However, one training method currently lacking from Middle Tennessee State University's program is interactive video training. Due to the regulations that govern MTSU's flight school, a specialized and specific training aid must be created in order to be used in flight training. This project has created an interactive video series in compliance with the specific regulations, which allows video series the potential for use in MTSU's flight training program.

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List of Abbreviations

ACS	Airmen Certification Standards
CFR	Code of Federal Regulations
DPE	Designated Pilot Examiner
FAA	Federal Aviation Administration
FADEC	Full Authority Digital Engine Control
MTSU	Middle Tennessee State University
RPM	Revolutions per Minute

CHAPTER I

INTRODUCTION:
IMPROVING STUDENT PILOT LEARNING

Due to the current lack of video training in MTSU's Part 141 private pilot training program, this project has created an interactive video series that serves as a supplemental video training aid for MTSU's private pilot training course. The video series created conforms to the standards of 14 CFR part 141.41c, so it has the capability to assist as a training aid in MTSU part 141 flight training. This project is important to provide a supplementary and effective instructional aid for flight instruction. The project looks to supplement MTSU's Part 141 Private Pilot training course, and its student pilots. The series of videos is comprised of eight videos, each addressing a unique topic from the Private Pilot ACS. Material covered will consist of the following flight tasks from the Private Pilot ACS; Steep Turns, Ground Reference Maneuvers, Emergency Descents, Normal Takeoffs and Landings, Unusual Attitude Recovery, Slow Flight, Power-on Stalls, and Power-off Stalls. These flight tasks of the ACS were chosen because these comprise the foundational tasks for the Private Pilot certification.

The Middle Tennessee State University (MTSU) Department of Aerospace takes Professional Pilot students from no flight experience to being fully prepared for a career in the aviation industry. This evolution is achieved through flight training resulting in the acquisition of a succession of pilot certificates. The first pilot certificate to be obtained is the Private Pilot certificate. Those who have begun their flight training toward their Private Pilot certificate, but have not yet completed training, are referred to as student pilots. Student pilots at MTSU are enrolled in MTSU's 14 CFR Part 141 pilot school. A

Part 141 pilot school is a flight school that is certificated by the Federal Aviation Administration (FAA) and is subject to FAA oversight. Part 141 pilot schools often provide superior training to their traditional pilot school counterpart, Part 61 flight schools, because the schools may provide a greater variety of training aids, require dedicated training facilities, flight instructor oversight, and FAA-approved course curricula. The Code of Federal Regulations (CFR) 14 Part 141.41c addresses the specific use of training aids used in Part 141 pilot training stating, “Each training aid, including any audiovisual aid, projector, mockup, chart, or aircraft component listed in the approved training course outline, must be accurate and relevant to the course for which it is used” (FAR/AIM, 2023, pp. 388-389). Therefore, any training aid to be used in the MTSU private pilot training course should be accurate and relevant to the Diamond DA-40-180, the aircraft used in private pilot training at MTSU, and to the primary sources of flight education such as the *Airplane Flying Handbook* and the *Pilot's Handbook of Aeronautical Knowledge.* The use of these primary sources is important to the flight education environment because they serve as the standard for the evaluation of students as students are tested for the obtainment of each level of pilot certification. This project produced an educational interactive video series that follows the restrictions of Part 14 CFR 141.41c so that the series has the potential to be introduced to the MTSU Part 141 private pilot training course. An interactive video is a video in which the viewers can actively engage in the content they are watching. Studies have shown that interactive video learning can be superior to traditional classroom learning (Aggarwal, 2003).

MTSU students currently learn flight training material simultaneously in two courses, neither of which includes interactive video learning. Student pilots are enrolled in the AERO 2230 Professional Pilot 1 and the AERO 2201 Professional Pilot 1 flight lab. The combination of these two classes combines one-on-one student/instructor learning with learning in a classroom lecture setting. When conjoined, these courses prepare students for their Private Pilot practical tests.

To obtain the Private Pilot Certificate, a student pilot must take and successfully pass the associated Federal Aviation Administration (FAA) practical test, also referred to as the check ride, with a Designated Pilot Examiner (DPE). The guidance for evaluation is published by the FAA in the Airmen Certification Standards (ACS). The ACS gives detailed descriptions of the knowledge, risk management, and skills on which students will be evaluated during the check ride. Within the *Airplane Flying Handbook,* the FAA outlines how each maneuver is to be demonstrated; however, issues arise from this one source. The FAA gives general descriptions of each maneuver because flight training can occur in a variety of aircraft besides the DA-40-180. The specific execution of flight maneuvers can vary from aircraft to aircraft due to differences in aircraft designs. For example, labeled airspeeds will vary from aircraft to aircraft. To address the need for aircraft specific guidance, MTSU provides students with the DA-40 Standardization Manual training aid. The MTSU Standardization Manual is a guide that publishes the standardized procedures, specific to the Diamond DA-40, to be used in a pilot's flight training. It is developed in accordance with the ACS, Practical Test Standards, FAA Handbooks, checklists, and the MTSU training syllabi. The MTSU Standardization Manual is an effective training aid; however, the Standardization Manual is comprised of only text and still images. Visualizing flight maneuvers through a video, rather than just reading about them, can improve student learning. The addition of an interactive video instruction aid, under the limitations of 141.41c, can serve as a supplemental training aid to MTSU student pilots.

This project is targeted toward student pilots at a specific point in their training. Student pilots who have already received the initial instruction in each subject area from their certified flight instructor are the target audience. These videos are produced to the purpose providing a supplemental visual instructional aid. The *Aviation Instructors Handbook* states that instructional aids are not self-supporting material. Rather, instructional aids function to support, complement, and reinforce what is already being taught (AIH, 2020, pp. 5-23).

This Honors thesis project has created an interactive video series to be a video instructional aid for MTSU's Part 141 private pilot certification train course. Each video within this project conforms to the regulation 14 CFR 141.41c. The regulation discusses the use of training aids in a 14 CFR Part 141 pilot school. The project is important because it supports student pilots an engaging alternative to current training aids in use at the MTSU flight school. Eight topics, which make up the core topics for examination of student pilots, are covered in the video series.

My Honors College thesis is comprised of four chapters. The first chapter is titled "Introduction," and I discuss the format of Middle Tennessee State University's Part 141 flight training, the requirements of training aids in a Part 141 flight school, and the topics covered in this video series. Chapter Two is titled "Literature Review." In this chapter, I review relevant literature that explains how best to prepare an educational video series. The third chapter is titled "Methodology," in which I discuss the systematic approach to producing this project. The fourth chapter is title "Reflection", in which I reflect on what

I learned from the project, the challenges encountered undertaking it, positive factors, and the potential future of the project.

CHAPTER II

LITERATURE REVIEW:
BENEFITS OF INTERACTIVE VIDEO INSTRUCTION

Constructivist Theory

After reviewing various theories of learning, interactive videos have been chosen as the product for this project. Based on the tenets of constructivist learning theory, interactive videos can provide superior learning experiences compared to their traditional video counterparts. Constructivist learning theory states that learning occurs through assigning meaning to experiences (Bada & Olusegun, 2015). Two key concepts, accommodation and assimilation, exist in the constructivist theory, which explains how students learn through their experiences. Assimilation is how students perceive and adapt to new information. It can be characterized by using already existing schemas within the mind to learn new information. Accommodation is when students adapt what they already know based on new information. It can be characterized by taking new information from one's environment and altering pre-existing schemas within the mind to learn. When students must accommodate or assimilate during learning, it becomes an active learning experience. Thus, interactive activities that include active participation promote learning more than passive activities (Zhang, 2006).

Cognitive Theory

The cognitive theory of learning is often contrasted with constructivist theory. Cognitive theory analyzes what is occurring within the mind during instruction. Cognitive theory explains how people can learn more by using multimedia. It states that students learn better from words and pictures than just from words alone (Mayer, 2014). Three assumptions of human behavior— the dual-channel assumption, limited capacity, and active processing—work to explain cognitive theory's applications in multimedia.

The dual-channel assumption supposes that humans receive information, and thus learn, from two channels (Mayer, 2014). These two channels are the visual and auditory channels. For example, when a student views a picture, the brain interprets the image through the eyes and the visual channel for information. Additionally, when a student hears a narrator speak, the brain interprets the words through their auditory channel. These two channels can also work in tandem together. For example, when a student reads words off a page, the information may initially be in the visual channel, but the reader may mentally convert that information into an auditory channel. Cognitive theory argues that more information can be processed when both information channels are used contrasted to just a singular channel, resulting in better learning (Mayer, 2014).

The limited capacity assumption states that humans are limited to the volume of information they can process at any given time (Mayer, 2014). For example, the smaller amount of information provided to a student, the more the individual will be able to remember. The limited capacity assumption builds on the dual-channel assumption to state that both information channels have their own separate limited capacities (Mayer, 2014). This means that there is a separate amount of visual and auditory information memory available to humans. When these channels work together, memory can be optimized. However, human memory is still relatively small. An average human's memory can only hold five to seven pieces of information (Mayer, 2014). Memory can be organized into three categories: sensory, short term, and long term. Sensory memory occurs over an extremely short period of time and is characterized by initially interpreting information. Short-term memory usually lasts for up to a minute and is characterized by memorization. Long-term memory is almost permanent and is characterized by knowledge. Videos allow students to engage both visual and auditory channels, which allows for enhanced memorization and knowledge.

The last assumption, active processing, states that students actively engage in cognitive processing of information (Mayer, 2014). Active learning occurs primarily in multimedia by organization of material. When students receive information, they actively participate in learning by making mental models of the information received (Mayer, 2014). All three assumptions combine to explain how students learn through multimedia. Information is initially received through information channels. Then, it is organized into memory, and lastly, if the active learning process has occurred, information can make it to long-term memory.

Cognitive Load Theory

Cognitive Load Theory, a subcategory of cognitive theory, attempts to explain the balancing of actions within the mind during instruction (AIH, 2020, pp. 3-4; Plass et al., 2010, p. 9). It states that three components make up any learning experience. These three components are intrinsic load, germane load, and extraneous load. Intrinsic load can be defined as the level of inherent difficulty and complexity of a subject. Next, germane load is the amount of cognitive work required to reach the completion standards of a lesson. Lastly, the extraneous load can be defined as all of the cognitive work that does not directly help the learner towards the completion standards.

Cognitive load studies have made four recommendations that best optimize the learning experience within videos. These recommendations are signaling, segmenting, weeding, and matching modality. Signaling provides the student by highlighting visual symbols to draw the viewer's attention to a specific region of the screen. Signaling provides the benefit of reducing the extraneous load while enhancing the germane load (Brame, 2016, p. 3). Next, segmenting is the concept of grouping and dividing information into groups. Segmenting allows for the management of the intrinsic load and the enhancement of germane load (Brame, 2016, p. 3). Next, weeding is the process of keeping videos concise and not providing the viewer with extraneous information. The process of weeding provides the viewer benefit by directly reducing the extraneous load (Brame, 2016, p. 3). Match modality is the process of using both the visual and auditory channels simultaneously to complement each other. The use of match modality will enhance the germane load (Brame, 2016, p. 3). By including components of all four recommendations, the student's experience can be optimized and promotes effective learning.

Video Length

Video length is a factor in determining student engagement during instructional videos. Studies have found that shorter videos lead to better student engagement (Guo, 2014, p. 41). A study that analyzed over 6.9 million educational online video watching sessions revealed that the median student engagement time was six minutes, regardless of video length (Guo, 2014, p. 41). However, multiple factors contribute to engagement. Studies analyzing college students found that they often watch a video more than once, and they watch for longer periods of times with a mean average watch time of 17-20 minutes. To keep students engaged throughout the entire video, each video in this project will aim to be six minutes or fewer in length.

In recent years, videos have been used in higher education for their ability to help reach desired learning outcomes. These various outcomes have been identified as engaging learners, moving from shallow to deep learning, providing exemplars, showing real life practices and contexts, showing complexity, encouraging better practices, showing factual and procedural content, and directly instructing and describing subject matter (Winslett, 2014). To achieve each of the desired learning outcomes, different methods are used during the video production. These methods include simple animations, screen recording, and voice-overs (Snelson, 2011).

Techniques used in traditional video production differ heavily from those used in educational videos. Traditional video often encourages showing the message, rather than telling the message. However, educational videos promote explaining the subject (Winslett, 2014). Visual storytelling is still used in the educational video, but to a much lesser degree than its traditional video counterpart. Videos within this series will use animations, screen recording, and voice-overs to lead the student to the desired learning outcomes through both visual and auditory explanations. By incorporating all academic components into the video series, the interactive videos will be effective for learning.

CHAPTER III

METHODOLOGY: SYSTEMATIC APPROACH TO THE VIDEOS

Process for Creating the Videos

The process for creating the Diamond DA-40 Interactive Video Guide was a multifaceted, multi-stage process. The first stage of the process included planning. For the project to be successful, all aspects of it needed to be planned ahead of time. During planning, the decision to use Microsoft Flight Simulator as the platform for recording was made. This project used flight simulation software in place of filming in actual airplanes. Microsoft Flight Simulator presents realistic flight physics and the Diamond DA-40 airplane model. The use of Microsoft Flight Simulator was the best option for this project because operating aircraft for the purpose of video production presented a rather large list of issues. First, and most importantly, the issue of safety. To properly film a video series of this nature it would involve a flight mission that requires multiple aircraft flying within a close proximity to each other, which presented a large safety hazard. Second, to operate multiple aircraft simultaneously for the purpose of filming presented a monetary issue. MTSU Diamond DA-40's currently cost $255 per hour to rent. The Microsoft Flight Simulator software is free to use upon initial purchase, so the use of flight simulation software was chosen.

Upon completion of my research, I knew that each video would need to follow an outline. Each video's outline has a beginning, middle, and conclusion. At the beginning of each video, the viewer would be briefed on the overview, purpose, and objective of each flight maneuver. After the introduction, the video would transition by providing the viewer with necessary context and background information applicable to each maneuver. Next, the video would then transition to the execution of each maneuver and the completion standards. Lastly, the student would be interactively questioned regarding the information within each video.

Once each video was outlined, I wrote the script. These scripts were recorded using technology available in the James E. Walker Library on MTSU's campus. The Makerspace in the library offers a resource known as the podcasting studio which is equipped with a soundboard and professional quality microphones. One by one, each script was recorded as an audio file and saved for the project.

Once each script was written and recorded, a storyboard was completed. During a storyboarding process, thoughts are written down and simple sketches are drawn along several grids. These described each visual shot that was to be recorded., This process served to guide the visual recording process. Once each storyboard was completed, video recording began. Each video recording process took place using the Microsoft Flight Simulator software. Using screen recording software, I flew the flight simulator to record the required video clips.

Once the video footage was recorded, it was imported into a project timeline in the Adobe Premiere Pro video editing software. In addition, the audio files of the written scripts were imported from a service known as Envato Elements. All properties used from Envato Elements were acquired under license and used legally. These properties were used to demonstrate certain supplemental audiovisual elements that could not be recorded in the Microsoft Flight simulator Software. Each video was completed in order, in sequences before moving on to the next.

After a draft of a video had been completed, it was then edited in an attempt to comply with supporting research. The editing process closely aligned with the process of weeding to remove and eliminate information that may unnecessarily increase the viewer's cognitive load. Additionally, the editing process often included a rerecording session, in which certain video or audio clips had to be rerecorded again due to the original not meeting the standard for the project. Rerecorded clips were then re-entered into the Adobe Premiere Pro timeline. Once the drafts were ready, they were exported and sent to Dr. Wendy Beckman, Aerospace Professional Pilot faculty member, and Mr. Nathan Tilton, MTSU Flight Training Manager, for feedback. Once feedback was received, applicable changes were made.

Upon receipt of feedback and drafts being updated, the videos were then shown to a group of student pilots. Feedback was then taken from this final team of flight incorporated into the final edits of the videos. Upon the completion of these edits, the videos were shown one last time to Dr. Wendy Beckman and Mr. Nathan Tilton for approval.

The group of student pilots provided positive feedback after watching the videos. Out of 36 responses, 97 percent of student pilots said that they would rather watch the video series in place of reading the MTSU DA-40 Standardization Manual. Additionally, all 36 respondents said they would use the video series on their own to help prepare for a flight lesson or a check ride. Student pilots were asked if they had any additional feedback for the videos, and from their feedback further changes to the videos were made. The most common response from the studentregarded video length, so the length of each video was reduced as much as possible.

Compliance to Research

In the creation of the video series, steps were taken to ensure compliance with relevant research. Based on the constructivist theory, this project attempted to accommodate students' learning. These videos are intended to be viewed after initial instruction, thus supplementing material already learned from a certified flight instructor in the aircraft, rather than replacing it. Additionally, detailed descriptions of each maneuver are given before visually demonstrating. These descriptions include explanations of relative aerodynamic information and applicable risk management factors to each maneuver.

Additionally, these videos combined both engaging videos and pictures with audio media. The combination of both video and audio during the videos reinforces the student for better learning based on the dual channel assumption of cognitive learning theory. Following the other tenet of cognitive theory, the limited capacity assumption, screen blur was used. When large amounts of texts were displayed visually on the screen, the background was blurred so that the amount of information being received by the viewer would be reduced to a manageable amount. This screen blurring technique was also a weeding technique used to reduce extraneous cognitive load. When text was being shown on screen, the background visual information became of lesser importance, and if not blurred, could lead to unnecessary cognitive load. Additionally, at the conclusion of each video the viewer is asked a series of questions based on material previously shown. These questions are asked to prompt the active processing of information presented inthe video. Questions and answer choices were chosen in such a way that they would pose a challenge to the student and require each student to reflect on what had just been watched. The questions, however, were not intended to be overly challenging or trick questions.

Several techniques were used to comply with the cognitive load theory. First, the concept of signaling was used, by showing specific text or images visually on the screen while the specific topic was being discussed. The intent of these textboxes or images was to draw the viewer's attention to specific information visually on the screen. Additionally, the process of segmenting was used to organize each video with a definite beginning, middle, and end. Introductions included the objective of each flight maneuver, stages of flight in which the maneuver is applicable, necessary aeronautical information applicable to the maneuver such as aerodynamics or risk management factors, and other information. After introductions, the execution of each flight maneuver was discussed. Each maneuver was explained to the precise operating standards as outlined in the Middle Tennessee State University's DA-40 Standardization Manual. Each video then concluded with a description of the Airmen Certification Standards for that specific maneuver and the video questions.

Each video was intended to be only six minutes in length. However, depending on the specific topic of each video this proved to be challenging. For example, some videos such as power on stalls and power off stalls are much shorter than the six-minute target. This was due to the amount of material necessary to properly cover those videos. For these videos to have reached their six-minute length, extraneous material would have had to have been added. Adding extraneous material to meet the time goal is counterintuitive to the previous research and academic processes of the project. However, some videos had the issue of being over six minutes in length. Videos such as the ground reference maneuvers exceeded six minutes because of the amount of material that needed to be covered. For example, ground reference maneuvers include three separate maneuvers, all of which apply the exact same principle, but each maneuver needed to be explained differently resulting in the length exceeding six minutes.

CHAPTER IV

REFLECTION:
TAKEAWAYS FROM THE PROJECT

Positive Factors

During this project, I encountered several positive factors which contributed to its completion. First was the incredible openness and cooperation I received from the MTSU flight school and its quality management team. The quality manager and assistant chief flight instructor, Nathan Tilton, volunteered to watch the videos and deliver feedback. Mr. Tilton made time in his incredibly busy schedule at the flight school to help contribute to the successful completion of the project.

Another positive factor was the busy but productive working environment that surrounded the project in the summer of 2023. During the working phase of the project, I became certified as a flight instructor and instrument flight instructor. Additionally, I was hired as a certified flight instructor at MTSU's flight school. The combination of these factors provided me helpful insight into the working professional flight instruction environment and how a project of my own could better serve MTSU's student pilots. The summer of 2023 enabled me to better apply the knowledge I had just learned in my certified flight instructor training to the project in meaningful and substantial ways.

Another positive factor of the project was the meetings with my thesis advisor, Dr. Wendy Beckman, throughout the entire project. During the school semesters our meetings were held often and were full of constructive feedback. Additionally, Dr. Beckman is the former chair of the MTSU Department of Aerospace and an experienced certified flight instructor with her own students at the MTSU flight school, which enabled her to provide valuable feedback and direction in the project. Regularly meeting during her office hours, Dr. Beckman's mentorship proved valuable to the success of the project. She always made herself available and would even give me quick feedback and suggestions as we passed in the hallways of the Business and Aerospace building or the MTSU Jean A. Jack Flight Education Center at the Murfreesboro Airport.

Problems Encountered

Throughout the project, a few issues were raised. However, the most recurring issue was with the use of the flight simulation software. Microsoft Flight Simulator is a realistic flight simulation software, but within it there was an issue that made the desired outcome of the project more difficult than initially thought. First, the Microsoft Flight Simulator software contains two separate Diamond DA-40 airplane models. The two models are the Diamond DA-40 NG and the Diamond DA-40 TDI. The two differing systems were an issue because the exact model that comprises Middle Tennessee State University's aircraft training fleet is the Diamond DA-40 XLS. The Diamond DA-40 NG model was the model selected to be used within the project because it more closely resembles the plane used in MTSU's training fleet.

The differences in the models are small but are visible to the viewer and small discrepancies are noted. First, the Diamond DA-40 NG uses a different powerplant than the XLS model. The XLS model uses a Textron Lycoming IO 360 M1A engine with a constant speed propeller. In contrast, the NG model uses an Austro Engine AE 300 turbocharged diesel engine. Additionally, the NG model is equipped with a full authority digital engine control system (FADEC). The main differences visible to the viewer from these discrepancies are the differences in engine control surfaces and the aircraft engine instrumentation pages. Due to the NG model being FADEC equipped, it has one engine control lever in which the pilot selects engine load on a scale of 0 to 100. In contrast, the XLS model possesses three separate engine control levers: a throttle, propeller, and mixture lever. To maintain simplicity in this project, the one lever on the NG model was shown whenever engine changes were being described. On screen text was also used to tell the viewer the specific power settings that were required in the XLS model. Next, in the flight simulation software, engine load is displayed on the aircraft's multifunction display. However, MTSU student pilots are not taught desired engine power settings in terms of load. Rather, pilots set specific required engine manifold pressure and revolutions per minute (RPM). To address this issue, close-ups of the multifunction display's engine page were not shown, and instead text of the desired power settings was shown in addition to images of the multifunction display's engine page that were captured during one of my own flights.

Next, the Diamond DA-40 NG model also possesses slightly different aircraft V speeds. An aircraft V speed is an airspeed defined by the manufacturer with some significant definition attached to it. The V speeds in the XLS model are often slightly slower than the NG model by a few nautical miles per hour. The discrepancy is small but is still noticeable to the viewer. To address this, the correct V speeds were displayed on the screen with overlying text and in software images from the Diamond DA-40 TDI model, which possesses the same aircraft V speeds as the XLS model.

Another issue encountered during the project was the mechanical skill required to control the flight simulation properly. Initially, a Microsoft Xbox controller was connected to the flight simulation software to manipulate the airplane model but aircraft control proved challenging. The flight maneuvers covered in this project require multiple simultaneous precise control inputs. The Microsoft Xbox controller often did not allow for the precision required to demonstrate flight maneuvers properly. For example, when demonstrating the normal takeoff during the Normal Takeoff and Landing video, a smooth and precise backward movement on the control stick is required during the aircraft rotation during takeoff, but the Xbox controller was too sensitive; too large of a control movement was consistently recorded. To remedy this error, a Logitech flight control system was purchased for the project that allowed for more precise movements of the aircraft flight controls.

Additionally, another issue encountered was the placement throughout the video of the questions. Initially, questions were intended to be placed throughout the video, but placing questions throughout caused issues with segmenting each video. Questions throughout interrupted the material being taught. After discussing this issue with my thesis advisor, the placement of the interactive video questions was relocated to the conclusion of each video.

Lastly, the a further encountered in the project was the unfortunate corruption of the micro-SD card used to store all the files used in the project. This corruption caused approximately one-third of the creative project drafts to be lost. The project had been backed up, but the project backup was not entirely up-to-date. The power-off stall video was entirely lost and thus had to be completely recreated. The steep turn video was approximately 50 percent compromised and had to be partially recreated. The final portions of the emergency descent video were also lost and had to be recreated. The time and effort lost were most unfortunate.

Future of the Project

During this large project, I have learned that creating an educational video, specifically centered on flight training, is challenging. However, completing this project has been fulfilling, both as an MTSU Honors student and as a certified flight instructor. I believe that the project could be further expanded to cover the entirety of the MTSU 141 private pilot training course to include all applicable skills required in the Private Pilot Airmen Certification Standards.

The concepts from the project could be applied to other projects. For example, Middle Tennessee State University's other flight training courses lack interactive video training aids. If the private pilot course were to be completed, a similar project addressing the flight school's other 14 CFR Part 141 flight training programs could be addressed. These programs include the University's instrument rating course and commercial pilot certification course.

Additionally, with the correct resources, this project could address the technical issues experienced during the making of the videos. Middle Tennessee State University possesses two diamond DA-40 simulators that offer closer specific characteristics to the Diamond DA-40 XLS model. A combination of these simulators with Microsoft Flight Simulator may be able to provide students with a more visually engaging and applicable video, specifically surrounding aircraft V speeds, engine power setting, and engine lever positions. Additionally, with correct safety planning and flight school support, the video series could be expanded using actual Diamond DA-40s. I believe that replicating and broadening the project using MTSU's fleet of training aircraft would provide the most complete and beneficial video, although the logistics of such additions prove challenging. However, if the flight school supports such a project, and safety can be assured, developing more training videos for student pilots would be a valuable addition to the university curriculum.

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Appendix

Bonner Instructional Flight-Training Videos

The flight-instruction videos written, produced, and edited,
from May through August 2023,
are posted on a YouTube channel.
The links to the actual videos are provided herein.

Normal Take-off and Landing
https://youtu.be/c77YiNCdMDo

Steep Turns
https://youtu.be/K1LmDyJ-KWY

Ground Reference Maneuvers
https://youtu.be/0nA3KVweQ60

Power-On Stall
https://youtu.be/ev8xLLrHpH8

Power-Off Stall
https://youtu.be/MVxtHmXKcRc

Emergency Descents
https://youtu.be/zQsdMp7JH2g

Slow Flight
https://youtu.be/_ktSLhnlnFo

Unusual Attitude Recovery
https://youtu.be/FC47nNXauPI