Collegiate Aviation Review International

Volume 40 | Issue 1 Peer Reviewed Article #5

5-31-2022

Examining Differences in Aviation Student Motivation During Blended Versus Online Asynchronous Courses

Nicholas Wilson, PhD
University of North Dakota

Robert Stupnisky, PhD
University of North Dakota

This study evaluated responses to an adapted version of the Academic Motivation Scale (AMS; Vallerand et al., 1992) to collegiate aviation students at a midwestern university in the United States. The study is informed by Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000a) and sought to investigate the motivational differences of students according to their enrollment in one of two course delivery methods. The study compared two groups of senior-level undergraduate students enrolled in an undergraduate advanced aircraft systems course. Seven sections of face-to-face blended (n = 161) were compared with two sections of online, asynchronous (n = 43) to compare for potential differences in motivational attributes evaluated through the AMS. Despite differences in course delivery characteristics, such as the amount of peer-interaction and social-presence as well as the flexibility inherent to the online asynchronous course, results of independent samples t-test did not reveal any self-selection bias, or students with shared motivational characteristics to enroll in one delivery method or another. As other studies have shown differences in characteristics of students enrolled in online courses (Deming et al., 2012; Money & Dean, 2019; Nguyen, 2015), this result is an important addition to the research literature available to administrators, faculty and curriculum designers within the collegiate environment. To ensure effective course design, further study is warranted with instruments outside of the AMS to determine the presence of other potential student differences of those enrolled in online courses.

Recommended Citation:
Wilson, N. & Stupnisky, R. (2022). Examining differences in aviation student motivation during blended versus online asynchronous courses. *Collegiate Aviation Review International*, 40(1), 95-112. Retrieved from http://ojs.library.okstate.edu/osu/index.php/CARI/article/view/8564/7783

Introduction

Online education is a growing presence in higher education (Seaman et al., 2018). Its origins can be dated back to the mid-1970s with the advent of email and similar electronic conferencing (Harasim et al., 1996). As technology, computing, learning management systems, and the myriad of visual presentation methods have become available, interest in online education seems to have followed (Seaman et al., 2018). Many studies have evaluated the effectiveness of online education (Nguyen, 2015), and within different disciplines (Means et al., 2009). Additionally, practitioners have evaluated and offered best practices of online education in selected learning environments (Johnson et al., 2014).

There are also documented differences in which student populations tend to enroll in online versus traditional face-to-face courses (Deming et al., 2012; Money & Dean, 2019; Nguyen, 2015). Typically, online courses have the benefit of being more flexible for the student and may tend to attract non-traditional learners at a greater rate than brick-and-mortar alternatives (Deming et al., 2012; Lei & Lei, n.d.). Research is expanding into understanding the motivation and academic outcomes of populations who enroll in online versus traditional forms of education (Artino & Stephens, 2009; Francis et al., 2019; Stewart et al., 2010). The present study seeks to expand this developing area of research into the collegiate aviation population. The purpose of this study was to test if students who enroll in blended face-to-face or online-asynchronous courses share common motivational attributes as observed through the Academic Motivation Scale (Vallerand et al., 1992). The article will start with a review of Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000a) and then a review of the current state of research on motivation in online education.

Review of Literature

Self-Determination Theory (SDT)

SDT is one mechanism by which educators, personnel managers and social psychologists understand human behavior within a particular contextual environment (Deci & Ryan, 1985; Ryan & Deci, 2000a). In the case of this study, SDT may inform our understanding of collegiate aviation student motivation within asynchronous online and blended learning environments. The three basic psychological needs (BPN) of SDT include an individual's need to demonstrate competence, their need for autonomy over actions and choice, and a desire to relate to others with whom they interact and who care for their well-being. An individual's attainment of the BPNs act as antecedents and are theorized to manifest into varying types and degrees of motivation (Ryan & Deci, 2000b). The perspective of the present study and the original use of the Academic Motivation Scale (AMS) (Vallerand et al., 1992) are founded in SDT.

Furthering the research into SDT, Ryan et al. (2009) refined the types of extrinsic motivation along a continuum from less autonomous to more autonomous. Starting with motivation from less autonomous (i.e., controlled) sources, Ryan et al. (2009) described *external regulation* where the individual performs behaviors simply to seek an outside reward or avoid a punishment. *Introjected regulation* describes an individual's task performance to feel better about him/herself or to avoid a negative impact to self-esteem. Moving towards more autonomous motivation, an individual may be driven to perform actions that they personally identify with, referred to as *identified regulation. Intrinsic motivation* is the inherent joy or pleasure witnessed through performing a particular activity. On the other end of the motivation spectrum *amotivation* describes a fundamental lack of intention to perform a particular task or activity (Ryan et al., 2009; Vallerand et al., 1992).

To fully apply SDT, it is important to understand the context in which the study occurs. A short summary of distance and online education follows along with growing research into online education in aviation as well as research into motivation and online education.

Distance and Online Education

Distance education has documented origins as early as the mid-1800s (Kentnor, 2015; Lee, 2017; Verduin & Clark, 1991). One example of this model included efforts at the University of London which identified students who were previously excluded from participation in higher education, such as women and minorities (Lee, 2017). In approximately the late 1960s, a model called the Open University of the United Kingdom, further expanded access to distance education, continued in the form of correspondence study witnessed in earlier examples (Lee, 2017). "This approach served the long-standing goal of distance education to increase access, especially for the educationally disadvantaged" (Garrison & Cleveland-Innes, 2010, p.16). As infrastructure and technology continued to expand, so did access to distance education.

Online education, a form of distance education, arrived with the advent of internet-enabled devices and represents, "a range of practices based on the Internet that provides synchronous and asynchronous communication in a personal and group environment" (Garrison & Cleveland-Innes, 2010, p.22). Stated differently, online education allows teachers and learners to interact at a distance using web technologies to close that gap (Lee, 2017). As instructors and students realized how technology could facilitate learning and exchange of knowledge, the available course offerings and facilitating technologies expanded rapidly.

Fast forward to present-day learning environments, students and instructors interact in a variety of technology-facilitated manners. Examples include live video-conferencing in the classrooms, which includes both face-to-face students and students working in disparate locations across the state, country or globe. Other examples of how technology facilitates online education includes remotely-proctored exams, such as via companies like ProctorU, that allow a student to take a computer-based exam while being video-monitored by a third party. Tools such as ProctorU allow significant flexibility to be enjoyed by the learner as well as the instructor of the course.

The structure and delivery of online courses may vary in one of several general structures. Online courses may be *synchronous*, whereby the instructor and students meet during a specified time for discussion and activity (Merriam & Bierema, 2014). During a synchronous online course, the experience of observing each other's non-verbal cues and hearing voices and concurrent feedback from instructors and peers may not be notably different than a brick and mortar learning environment. Online education may also be *asynchronous*. In this arrangement, students are not meeting the faculty member during a specified time and place to accomplish academic objectives. Although the structure of asynchronous only courses may differ in the quantity and method of educational technology or peer-interaction employed, at minimum, there are typically readings, peer discussion boards, videos, lesson homework or individual or group projects which the students must complete. Student deliverables may come with a structured milestone schedule or they may simply all be due prior to the end of the term. Decisions on course design are typically the volition of the instructor, and therefore will vary just as traditional face-to-face courses have today. Courses may also be delivered with *blended* instruction, which includes a combination of face-to-face and online (Merriam & Bierema, 2014). There are a variety of characterizations of hybrid or blended courses. However, the terms generally refer to the use of information delivery in an online environment (outside of the classroom) paired with some element of face-to-face or "seat time" with an instructor and classmates (Lei & Lei, n.d.; University of Wisconsin, 2020). Typically, lectures or other course material are covered outside the classroom, where peer interactions and material application with course material occur in a formal setting (e.g. labs or problem-based learning) (Lei & Lei, n.d.).

Student Motivation and Performance between Online and Traditional Education Formats

A growing body of research continues to evaluate differences in student motivation and performance between course delivery methodologies. Francis et al. (2019) studied the motivation and performance of over 2,400 community college students enrolled in either online or face-to-face developmental math courses. The authors found student motivation did not differ significantly across course delivery methods, yet online students received lower grades and were more likely to drop out. Additionally, the results suggested that status as an adult learner predicted lower academic outcome and higher dropout in online environments. Artino and Stephens (2009) reviewed the academic motivation and self-regulation of undergraduates and graduates learning online. The research suggested no difference between graduate and undergraduate students within task value or self-efficacy, but a statistically significant difference regarding continuing motivation, the undergraduate group reporting higher intention to enroll in future courses offered online. Research by Stewart et al. (2010) suggested, "students had clear preferences with regard to the delivery mode and the factors that motivated students to complete traditional degrees were the same factors that motivated students to complete online degrees" (p. 375). Yet, Stewart et al. continue to suggest differences in extrinsic motivators, such as time constraints and home responsibilities between online and traditional students. On the topic of student success, Johnson and Mejia (2014) cite that students enrolled in online courses in California's community colleges are less successful than in traditional courses. Research continues to expand into online and traditional education more broadly, yet this area of research remains limited within aviation education. A summary of relevant research of distance and online education within collegiate and professional aviation is included below.

Distance and Online Education in Aviation

There is a limited body of research on distance and online education within the collegiate aviation and airline domains. Kearns (2016) authored a text focusing on theory, effectiveness and topics related to instructional design for e-learning within aviation. Prather's (2018) research used survey data to gather opinions on awareness, effectiveness, and interest in distance learning versus face-to-face options for individuals interested in careers in airport operations. Prather's research suggested individuals may have concerns over the quality of distance degree programs, but also viewed them as more flexible. Scarpellini and Bowen (2018) conducted a phone-based qualitative survey to gather information on the assessment of distance degree programs within collegiate aviation institutions. Raisinghani et al. (2005) conducted a survey of business aviation professionals and their attitudes towards online training. Their research suggested such factors as efficacy, compatibility, and perceived usefulness as being important to the business aviation pilot. The research by Raisinghani et al. suggests stakeholders were aware of and planning for the arrival of distance and online education within aviation almost two decades prior to the current study. As limited research exists on this topic within the collegiate aviation environment, the present study seeks to add to the body of knowledge of student motivation and performance as these students choose between enrollment in blended and online, asynchronous course delivery.

Learning and Motivation with Generation Z

Generation Z is identified as those born between the years of 1995 and 2010 (Seemiller & Grace, 2017; Mohr & Mohr, 2017). As it relates to this study, most of the student participants would be considered members of Generation Z during the years 2018 and 2019. Generation Z shares many similarities to their well-researched predecessors, the Millennials, however, have been identified as having a distinct set of traits from the prior generation. Generation Z, also referred to as the *Digital Natives*, are documented to have more access to information than any prior generation at their age (Seemiller & Grace, 2017). Additionally, Generation Z has more economic well-being, is more highly educated and is more diverse (Schroth, 2019; Mohr & Mohr, 2017). Schroth also cites that the Digital Natives are less likely to have worked when they were young and are more likely to experience or be diagnosed with anxiety and depression. Potentially related to these latter points, the author also suggests that overprotective parenting impacted their ability to learn life skills and has made it "difficult for them to become autonomous adults" (Schroth, 2019, p.10). Generation Z's relationship with technology, also resulting in their descriptive secondary moniker, has negatively impacted traditional means of face-to-face communication. Schroth (2019) states in reference to over-reliance on technology, "this can impair their ability to effectively communicate and interact with others" (p.13). As evidence of their comfort with technology and education, it has been cited that Generation Z students prefer flipped courses and rely on sites such as YouTube for instruction (Seemiller & Grace, 2016; Mohr & Mohr, 2017). Yet, for this cohort, preference for and comfort with technology may not translate well into skills needed in the workplace. It is within this context that additional study of generational motivation towards traditional, blended and online, asynchronous learning should occur and be evaluated against performance of employee cohorts post "onboarding". This study represents one such data point.

Selection Bias

Sample (selection) bias may occur when members of a sample differ from the larger population in a systematic fashion (Blair et al., 2014). Selection bias can occur with quasi-experimental (non-random) samples when unobserved characteristics of participants differ meaningfully between groups and membership in one group or another is correlated with the unobserved characteristic (Deschacht & Goeman, 2015). In the case of online education more broadly, there have been assessments of such selection bias; focusing primarily, although not exclusively on issues such as socioeconomic status, race, gender and age. Deming et al. (2012) evaluated for-profit providers of online education and found, "the for-profit sector disproportionately serves older students, women, African-Americans, Hispanics, and those with low-incomes" (p.146). Money and Dean offered a much more comprehensive approach to the analysis of online student differences, they also reiterate that participants in online education tend to be older as well as more economically and socially disadvantaged (2019). What remains is to expand our understanding of selection bias outside of socioeconomic, gender, race or class and evaluate more subtle differences, such as motivation, in student populations. No difference between groups in student motivation would suggest that a student with a degree in Commercial Aviation is a student with a degree in Commercial Aviation. How they received the degree would matter little. A statistically significant result would suggest more advantageous or problematic outcomes for the career pathway as it would suggest that students may self-select into certain academic/course options due to personal or motivational differences. These individual differences are not likely to be accommodated in a highly standardized, highly regulated aviation industry.

The purpose of the current study is to evaluate for differences in motivation between students who enrolled in either a blended section or online, asynchronous section of a senior-level advanced aircraft systems course. The Academic Motivation Scale (AMS; Vallerand et al., 1992) will be used to evaluate for differences on five subscales, including *Intrinsic Motivation, Identified Motivation, Introjected Motivation, External Regulation,* and *Amotivation.* As a secondary analysis, the dataset also is analyzed for any predictive relationship between the AMS subscales and academic outcome, as well as potential differences in responses to the AMS by gender. Informed by SDT (Deci & Ryan, 1985; Ryan & Deci, 2000a), this is expected to inform our understanding of the relationship of collegiate aviation student motivation and course delivery.

Research Questions

Q1. As measured by the Academic Motivation Scale (AMS; Vallerand et al., 1992), do aviation students who choose online, asynchronous courses differ in motivation compared to aviation students who enroll in blended, face-to-face methods of course delivery?

Q2. Do gender differences exist for aviation students as measured by AMS subscales?

Q3. Do any subscales of the Academic Motivation Scale (AMS; Vallerand et al., 1992) show a predictive correlation relationship to academic outcome in the courses?

Methods

Procedure

Students enrolled in a senior-level advanced aircraft systems course at a Midwestern United States research university were recruited to complete a Qualtrics online survey. The survey and data collection were approved by the Institutional Review Board (IRB) of the collegiate location and all participants in the study provided consent using common methods approved by the IRB. Aviation undergraduate students who were enrolled in this advanced transport category aircraft systems course were recruited to participate through an in-class announcement followed by an email link to the survey from the course instructor.

The sampling frame included seven course sections utilizing a blended, face-to-face design and two sections using an online, asynchronous design. To ensure consistency of course content and assessments, all sections except for one blended face-to-face section were taught by the same instructor. The single section taught by a different instructor was standardized, using the same courseware, exams, and teaching methods. A total of 243 participants were invited to participate of which (N = 204) responded, yielding an 83.9% response rate. The students in the study included (n = 161) blended, face-to-face environment or entirely (n = 43) online, asynchronous methods. Students were provided the survey online via the Qualtrics survey tool after completion of approximately 75% of the academic term.

Participants

All participants in the study were collegiate aviation students enrolled in a four-year aviation baccalaureate program. By virtue of enrollment in the course in which the study was conducted, all students had previously completed coursework and Federal Aviation Administration (FAA) requirements to possess a commercial pilot certificate with single-engine, multi-engine, and instrument ratings. Additional demographic detail of study participants, including comparison by course delivery method, are included in Table 1.

Table 1
Sociodemographic Characteristics

	Combined Dataset	Blended	Asynchronous
	N = 204	*n* = 161	*n* = 43
Mean Age (SD)	22.1 (3.07)	22.1 (2.90)	22.2 (3.68)
Gender			
Male *n* (%)	176 (86.8)	141 (87.6)	35 (81.4)
Female *n* (%)	27 (13.2)	19 (11.8)	8 (18.6)
Gender Not Reported *n* (%)	1 (0.5)	1 (0.5)	-
Academic Preparation			
GPA (*n)*	3.47 (202)	3.45 (159)	3.51 (43)
ACT Score (*n*)	25.7 (129)	25.7 (102)	25.8 (27)
Racial Identity			
White *n (%)*	172 (84.3)		
Asian *n* (%)	14 (6.9)		
Not Reported *n* (%)	10 (4.9)		
More Than One Race *n* (%)	6 (2.9)		
Black or African American *n* (%)	1 (0.5)		
Native Hawaiian or Pacific Islander *n* (%)	1 (0.5)		
Academic Year			
Senior-Status (%)	169 (82.8)		
Junior-Status (%)	34 (16.7)		
Sophomore Status (%)	1 (0.5)		
Enrolled in or intended to enroll in defined career pathway (%)		114 (70.8)	33 (76.7)

Note: Due to small numbers of respondents in certain racial identity groups, quantities not reported between delivery methods to retain participant anonymity.

Measures

Motivation was measured using the Academic Motivation Scale (AMS) developed by Vallerand et al. (1992) and adapted to the collegiate aviation environment. The survey instrument was comprised of five constructs each containing four manifest variables assessing types of motivation: Intrinsic Motivation, Identified Motivation, Introjected Motivation, External Regulation, and Amotivation. See Table 2 for example statements for each motivation subscale.

The survey response options were provided on a five-point Likert-type scale. Responses range from: 1 = *Does not correspond at all*, to 5 = *Corresponds exactly*.

Table 2
Example Statements Represented by Motivational Subscales

Motivation Sub-Type	Exemplar Statement
Intrinsic	"Because I experience pleasure and satisfaction while learning new things."
Identified	"Because eventually it will allow me to enter the job market in a field that I like."
Introjected	"To prove to myself that I can do better than just a high-school degree"
External Regulation	"In order to get a more prestigious job later on."
Amotivation	"Honestly, I don't know. I really feel that I'm wasting my time in college.

Note. (Vallerand et al., 1992, p. 1008). Subscales arranged from most self-determined (intrinsic) to least self-determined (amotivation).

Results

Survey data was downloaded to SPSS and three cases of non-response to the AMS were excluded and similar response pattern matching (SRPM; Byrne, 2016) was applied to isolated datapoints within six cases to complete datapoints missing at random yielding (N = 204) responses. Participants were coded as belonging to one of two groups: (1) blended/face-to-face section (n = 161), or online-asynchronous course (n = 43). To assess internal consistency of the AMS within a new discipline, reliability analysis was performed in SPSS for each of the defined motivational subscales. Cronbach's alpha ranged from .74 to .87 (Table 2). Each of the four individual sub-scale items were averaged into new variables representing their pre-established motivational subscale (amotivation, intrinsic, etc.) adapted from the AMS (Vallerand et al., 1992). A correlational analysis was completed in SPSS and results are shown in Table 2. A exploratory factor analysis (EFA) was performed on the 20 individual survey items. Using principal axis factoring, a five-factor fixed solution was defined based on the original AMS using oblimin rotation. The results are consistent with the original AMS except for one survey (Ext_ID4) which showed stronger loadings on the *intrinsic* motivation sub-scale. Results of the EFA factor loadings are shown in the Appendix.

Table 3
Reliability and Correlation of Composite Exam Score to AMS (N = 204)

	Intrinsic	Identified	Introjected	Externally Regulated	Amotivation	Cronbach's α
Exam Score	.02	.05	-.04	.02	-.11	
Intrinsic	1					0.84
Identified	.64*	1				0.77
Introjected	.51*	.52*	1			0.87
Externally Regulated	.35*	.44*	.51	1		0.74
Amotivation	-.36*	-.49*	-.15	-.12*	1	0.83

Note. *p <.05. Correlational analysis includes observations recorded during last quarter of offered term of blended face to face and online, asynchronous course.

Next, a confirmatory factor analysis (CFA) was performed using the Analysis of Moment Structures version 27 (AMOS; Arbuckle, 2017). Individual factor loadings and fit indices of the measurement model suggested acceptable fit with some opportunity for improvement (Chi-square = 322.91, RMSEA = 0.07, CFI = 0.92, TLI = 0.90, SRMR = 0.07). Model fit was improved after review of modification indices (MIs) suggested addition of two covariance paths between two separate sets of error terms on separate latent constructs. Final model fit was deemed acceptable for further analysis (Chi-square = 281.73, RMSEA =0.062, CFI =0.938, TLI =0.926, SRMR =0.064). Analysis of convergent validity was performed by calculating average variance extracted (AVE) for individual subscales. Evidence of convergent validity was shown on the intrinsic, introjected, and amotivation subscales. Moderately low factor loadings on external regulation and identified scales suggested inadequate convergent validity. Lastly, the adapted AMS was evaluated for discriminant validity through comparison of the average AVE between constructs to the squared bivariate correlation between the compared latent constructs. The instrument showed evidence of discriminant validity between all scales except for between the intrinsic and identified scales. Overall, the adapted AMS showed acceptable validity within this sample population.

To assess for potential differences in motivational attributes of students, independent samples *t*-tests were performed between the two groups of students enrolled in the blended face-to-face versus online/asynchronous sections. Manifest variables of each scale were summed into new average variables representing the subscale and the *t*-tests were performed on each of the five motivational subscales included in the AMS. Results suggests no difference in motivational attributes on individual subscales of the adapted AMS between students enrolled in the two different course delivery methods.

As the original AMS study by Vallerand et al.(1992) noted differences in certain motivational subscales by a participant's gender, independent samples *t*-tests were also performed on the five motivational sub-scales by gender for the combined courses (N = 204). Although data approaches significance for Intrinsic Motivation and Amotivation, statistical tests suggest no difference in academic motivation by a participant's gender when combining responses between both delivery methods.

The data suggests no difference in the students within the two delivery methods as well as no difference in reported motivation on any subscale when evaluated by a students' gender. The researcher was then interested to see if any of the subscales appeared to be predictive of academic performance. To accomplish this test, the researcher included all five of the subscales into a simple linear regression model as the independent variables and the students' averaged exam score as the dependent variable. No individual subscale appeared predictive of the academic outcome and the overall model was not significant, $F(5,198) = 0.679$, $p>0.05$.

Discussion

Self-Determination Theory (Deci & Ryan, 1985) suggests that individuals have a need for autonomy, competence and an ability to relate to others. As we change our course design to embrace technology and increase flexibility for the learner, one could postulate potential changes to levels of autonomy and relatedness available to the learner between the course delivery methods. It was within this domain that the researcher sought to re-evaluate the AMS (Vallerand et al., 1992) to assess for potential differences in student motivation as they progress along their learning path within the aviation discipline.

Results of the present study show similar internal reliability compared to the original assessment of the AMS, with no notable differences in Cronbach's alpha between the two. This result suggests that modification of the AMS to the aviation discipline does not negatively impact scale-reliability. Correlation between the motivation subscales also appear to have expected outcomes with all forms of external motivation (e.g. identified, introjected and externally regulated) showing positive correlation with each other, as well as intrinsic motivation showing moderately strong, positive correlation to the three other measures of external motivation. As expected, the amotivation subscale shows negative correlation to all other motivation subscales ranging from weak to moderately strong negative correlation, particularly with identified motivation. It would be expected for a pilot to show amotivation (lack of amotivation) if she/he is not able to recognize who their present actions affect their ability to achieve a career goal in the future.

Given the difference in course delivery method and the potential for students to self-select into a method where there are substantially lower amounts of peer interaction (relatedness) yet higher amounts of flexibility (required autonomy), the non-significant results of the independent samples t-tests were less expected. Although the prior academic preparation (GPA, ACT score) and age were not statistically different between the two delivery methods, the researcher expected to observe some student differences in the motivational scales between the blended/face-to-face group and the online/asynchronous group. Similarly, as there were previously gender differences noted in the first publication of the AMS, the researcher also expected to see potential for statistically significant differences between gender. Although there were differences in the mean responses for intrinsic ($p = 0.059$) and amotivation ($p = 0.062$) between genders, the results did not reach the level of significance. As additional data is collected, re-assessment of these two subscales for gender differences may be warranted.

The non-significant results between course delivery methods are a favorable outcome when considering the rising prevalence of online courses and programs in many fields (Seaman

et al., 2018). Through use of the AMS, the results of the study suggest that senior-level collegiate aviation students do not self-select into one course delivery method or another as a result of internal, personal factors associated with differing types of motivation, at least within the enrolled course. This result could suggest that the students' choice of enrolled course and the ultimate degree awarded may not be indicative of underlying motivational differences, when controlling for age and prior academic performance (GPA, ACT score). Airline and aviation recruitment may consider this as one piece of evidence to suggest that student enrolled in online education do not meaningfully differ across subsets of motivation.

Limitations

Data provided in this sample includes survey responses from collegiate aviation students within multiple consecutive sections of the same course, offered in two different course delivery methods. Due to the unique discipline of the sample population (aviation), the results of the study have limited generalizability to a broader population. On the topic of demographics, the sample population was predominantly white (84.3%) and male (86.8%). The study did not include enough representation across underrepresented populations to make meaningful statistical inferences. Expanding the study to include more students from underrepresented groups may yield differences across motivation. Finally, this study only included five subscales of motivation. Further research could be improved through inclusion of other psychometric scales useful to expanding our understanding of student differences in online and traditional education.

Implication for Practice

Despite changing enrollments across much of higher education, student enrollments in distance (online) education continues to rise (Seaman et al., 2018). Online courses offer a high degree of flexibility and offer the learner access to educational advancement without the limitations associated with attendance at a physical brick-and-mortar institution. Yet, there are many advantages and disadvantages of online courses compared to traditional face-to-face courses. Online, asynchronous courses require a higher degree of autonomy compared to traditional face-to-face or hybrid courses and also typically witness lower amounts of peer interaction (Lei & Lei, n.d.). Hybrid or blended courses, on the other hand, allow for continued peer interaction, instructor feedback and – presumably due to regular meetings – require the learner to require less autonomy than a comparable online asynchronous course.

Given the differences in course offering, the researcher sought to use this quasi-experimental design to assess for potential student self-selection into one of the two methods of course offerings; blended/face-to-face and online/asynchronous. To assess for such differences in motivation, the researcher adapted the AMS (Vallerand et al., 1992) to the collegiate aviation discipline. Reliability analysis of the adapted scale proved similar results to the AMS. Additionally, confirmatory factor analysis was performed on the data and showed acceptable construct validity for use within the sample population. Ultimately, independent samples *t*-test results did not suggest any difference in motivational attributes on the adapted AMS between the two groups of students by course delivery method or by gender. As Academia-at-large continues to offer more courses in online or distance formats, the results of this study offer another data

point into our understandings of student motivation in various forms of traditional and online education.

References

Airline Safety and Federal Aviation Administration Extension Act of 2010, 1 (2010).

Artino Jr, A. R., & Stephens, J. M. (2009). Academic motivation and self-regulation: A comparative analysis of undergraduate and graduate students learning online. *The Internet and Higher Education*, *12*(3-4), 146-151.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. In *Englewood Cliffs, NJ, US: Prentice-Hall, Inc*. https://doi.org/http://dx.doi.org/10.1037/13273-005

Becton, J. B., Walker, H. J., & Jones-Farmer, A. (2014). Generational differences in workplace behavior. *Journal of Applied Social Psychology*, *44*(3), 175–189. https://doi.org/10.1111/jasp.12208

Blair, J., Czaja, R. F., & Blair, E. A. (2014). *Designing Surveys: A guide to decisions and procedures* (3rd ed.). SAGE Publications Inc.

Boeing. (2019). *2019 Pilot & Technician Outlook Global Services*. https://www.boeing.com/resources/boeingdotcom/commercial/market/pilot-technician-services/assets/downloads/2019-pto-oshkosh-071819-FINAL.PDF

Congress, 110th. (2007). *Fair Treatment for Experienced Pilots Act*. 4.

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of research in personality*, *19*(2), 109-134.

Deming, D. J., Goldin, C., & Katz, L. F. (2012). The for-profit postsecondary school sector: Nimble critters or agile predators? *Journal of Economic Perspectives*, *26*(1), 139–164. https://doi.org/10.1257/jep.26.1.139

Deming, D. J., Goldin, C., Katz, L. F., & Yuchtman, N. (2015). Can online learning bend the higher education cost curve? *American Economic Review*. https://doi.org/10.1257/aer.p20151024

Deschacht, N., & Goeman, K. (2015). Selection bias in educational issues and the use of Heckman's sample selection model. In *Contemporary Economic Perspectives in Education* (pp. 35–51). Leuven University Press. https://doi.org/10.2307/j.ctt14jxsqg.5

Francis, M. K., Wormington, S. V., & Hulleman, C. (2019). The costs of online learning: Examining differences in motivation and academic outcomes in online and face-to-face community college developmental mathematics courses. *Frontiers in psychology*, *10*, 2054.

Garrison, D. R., & Cleveland-Innes, M. F. (2010). Introduction to distance education: Understanding teaching and learning in a new era. *Foundations of Distance Education*.

Glaser, B. G., & Strauss, A. L. (1967). Grounded theory The discovery of grounded theory. In *International Journal of Qualitative Methods*.

Harasim, L.N., Hiltz, S.R., Teles, L.., and Turoff, M. (1996). Computer networking and scholarly communication in the twenty-first-century university. *Choice Reviews Online*, *34*(02), 34-0970-34–0970. https://doi.org/10.5860/choice.34-0970

Heyns, M. M., & Kerr, M. D. (2018). Generational differences in workplace motivation. *SA Journal of Human Resource Management*, *16*(0), 10. https://doi.org/10.4102/sajhrm.v16i0.967

Higgins, J., Lovelace, K., Bjerke, E., Lounsberry, N., Lutte, R., Friedenzohn, D., Pavel, S., Chase, B., & Craig, P. (2013). *An Investigation of the United States Airline Pilot Labor Supply*. 36. https://www.researchgate.net/publication/249315130

Johnson, H. P., & Mejia, M. C. (2014). *Online learning and student outcomes in California's community colleges*. Washington, DC: Public Policy Institute of California.

Jurkiewicz, C. L., & Brown, R. G. (1998). Generational Comparisons of Public Employee Motivation. *Review of Public Personnel Administration*, *18*(4), 18–37. https://doi.org/10.1177/0734371X9801800403

Kearns, S. (2016). *E-learning in aviation*. Routledge.

Kentnor, H. E. (2015). Distance Education and the Evolution of Online Learning in the United States. *Curriculum and Teaching Dialogue*.

Lee, K. (2017). Rethinking the accessibility of online higher education: A historical review. *Internet and Higher Education*, *33*, 15–23. https://doi.org/10.1016/j.iheduc.2017.01.001

Lei, S. A., & Lei, S. Y. (n.d.). *Evaluating Benefits and Drawbacks of Hybrid Courses: Perspectives of College Instructors*. Retrieved October 15, 2019, from https://www.ingentaconnect.com/contentone/prin/ed/2019/00000140/00000001/art00001

Lutte, B. (2017). Pilot Supply at the Regional Airlines: Airline Response to the Pilot Supply at the Regional Airlines: Airline Response to the Changing Environment and the Impact on Pilot Hiring Changing Environment and the Impact on Pilot Hiring. *Journal of Aviation/Aerospace Journal of Aviation/Aerospace Education & Research Education & Research*, *27*, 2018. https://doi.org/10.15394/jaaer.2018.1749

Lutte, B. (2018). Pilot Supply at the Regional Airlines: Airline Response to the Changing Environment and the Impact on Pilot Hiring. *Journal of Aviation/Aerospace Education & Research*. https://doi.org/10.15394/jaaer.2018.1749

Lutte, R. K., & Mills, R. W. (2019). Collaborating to train the next generation of pilots: Exploring partnerships between higher education and the airline industry. *Industry and Higher Education*, *33*(6), 448–458. https://doi.org/10.1177/0950422219876472

Lutte, R., & Lovelace, K. (2016). Airline Pilot Supply in the US: Factors Influencing the Collegiate Pilot Pipeline. *Journal of Aviation Technology and Engineering*, *6*, 53–63. https://doi.org/10.7771/2159-6670.1148

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*. https://doi.org/10.1037/h0054346

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of Evidence-Based Practices in Online Learning. In *Structure*.

Merriam, S. B., & Bierema, L. L. (2014). *Adult learning: Linking theory and practice*. John Wiley & Sons.

Mohr, K. A., & Mohr, E. S. (2017). Understanding Generation Z students to promote a contemporary learning environment. *Journal on Empowering Teaching Excellence*, *1*(1), 9.

Money, W. H., & Dean, B. P. (2019). Incorporating student population differences for effective online education: A content-based review and integrative model. *Computers and Education*, *138*(March), 57–82. https://doi.org/10.1016/j.compedu.2019.03.013

Nguyen, T. (2015). The Effectiveness of Online Learning: Beyond No Significant Difference and Future Horizons. *MERLOT Journal of Online Learning and Teaching*.

NTSB. (2009). *Loss of Control on Approach Colgan Air, Inc.* https://www.ntsb.gov/investigations/AccidentReports/Reports/AAR1001.pdf

Pearce, B. (2012). The state of air transport markets and the airline industry after the great recession. *Journal of Air Transport Management*, *21*, 3–9. https://doi.org/10.1016/j.jairtraman.2011.12.011

Peterson, K. (2008). *Airline pilots brace for downsizing, career change | Reuters*. Reuters. https://www.reuters.com/article/us-usa-airlines-pilots/airline-pilots-brace-for-downsizing-career-change-idUSN0237590120080702

Prather, C. D. (2018). Distance learning in collegiate aviation: Meeting the needs of airport professionals. *The Collegiate Aviation Review International*, *24*(1).

Raisinghani, M., Chowdhury, M., Colquitt, C., Reyes, P. M., Bonakdar, N., Ray, J., & Robles, J. (2005). Distance education in the business aviation industry: Issues and opportunities. *International Journal of Distance Education Technologies (IJDET)*, *3*(1), 20-43.

Regional Airline Association. (2019). *Pilot Supply & Air Service Update*. https://www.raa.org/wp-content/uploads/2019/05/20190510-Pilot-Workforce-and-Training-Deck_May-Update_v3.pdf

Richardson, J. C., Maeda, Y., Lv, J., & Caskurlu, S. (2017). Social presence in relation to students' satisfaction and learning in the online environment: A meta-analysis. *Computers in Human Behavior*, *71*, 402–417. https://doi.org/10.1016/j.chb.2017.02.001

Ryan, R. M., & Deci, E. L. (2000a). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2000b). The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological inquiry, 11*(4), 319-338.

Ryan, R. M., Williams, G. C., Patrick, H., & Deci, E. (2009). Self-determination theory and physical activity - the dynamics of motivation and wellness. In *Hellenic Journal of Psychology* (Vol. 6, pp. 107–124).

Samost, J. (2018). *An Analysis of Regional Airlines' Response to the Pilot Shortage and How It Impacts Collegiate Pilots*. http://vc.bridgew.edu/honors_projhttp://vc.bridgew.edu/honors_proj/266

Scarpellini, N. M., & Bowen, B. D. (2018). Evaluation and action: Sustaining excellence in collegiate aviation distance education. *The Collegiate Aviation Review International*, *19*(1).

Schroth, H. (2019). Are you ready for gen Z in the workplace?. *California Management Review*, *61*(3), 5-18.

Scovel, C. L. (2012). *Aviation Industry Performance: A Review of the Aviation Industry, 2008-2011*.

Seaman, J., Allen, I. E., & Seaman, J. (2018). Grade increase: Tracking distance education in the United States. *Babson Survey Research Group*, 1–49.

Seemiller, C., & Grace, M. (2017). Generation Z: Educating and engaging the next generation of students. *About Campus*, *22*(3), 21-26.

Seemiller, C., & Grace, M. (2016). *Generation Z goes to college*. John Wiley & Sons.

Stewart, C., Bachman, C., & Johnson, R. (2010). Students' characteristics and motivation orientations for online and traditional degree programs. *Journal of Online Learning and Teaching*, *6*(2), 367-379.

University of Wisconsin, M. (2020). *Hybrid Courses: About Hybrid*. https://www4.uwm.edu/ltc/hybrid/about_hybrid/index.cfm

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement, 52*(4), 1003–1017. https://doi.org/10.1177/0013164492052004025

Verduin, J. R., & Clark, T. A. (1991). *Distance education: The foundations of effective practices.* Jossey Bass.

Wilson, N. D., & Daku, S. A. (2016). Industry in motion: Pilot study on instructor and management perceptions of new hire pilot technical and professional preparation. *International Journal of Aviation, Aeronautics, and Aerospace*, *3*(3). https://doi.org/10.15394/ijaaa.2016.1136