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Fostering Active Learning through AI-Integrated Platforms: Student Perceptions from a Large Enrollment Professional Education Course

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This study investigates how AI-integrated online learning platforms influence student engagement and learning experiences in a large enrollment, foundational course within a professional education program. Drawing on survey responses from 109 undergraduate students enrolled in an introductory aviation course, we assess student perceptions of an AI-supported classroom platform and examine whether these perceptions differ between students on flight and non-flight academic pathways. Most students reported positive experiences, particularly valuing features such as live polls and real-time feedback that supported interaction and knowledge reinforcement. Although no statistically significant differences were found between pilot and non-pilot students, pilot students expressed a stronger preference for collaborative and communicative functions. Open-ended feedback also identified areas for platform improvement, including enhanced integration with learning management systems and expanded AI functionalities. The findings offer practical implications for educators seeking to adopt AI-enhanced tools to support active learning and provide insights into how such technologies can be effectively implemented in structured, high-enrolment courses across disciplines.

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Introduction

Digital learning platforms have become widely integral to modern higher education, enhancing knowledge retention, increasing student engagement, and minimizing distractions from electronic devices in classrooms. Their significance has grown substantially during and after the COVID-19 pandemic, as educational institutions have increasingly adopted blended and hybrid learning approaches to provide flexible and adaptive educational experiences (Guppy et al., 2022). The widespread implementation of such platforms has promoted educators to examine how these platforms influence student engagement, learning outcomes, and classroom dynamics across various disciplines. Previous studies indicate that digital tools in the classroom can significantly enhance student engagement (Byon, 2005; Stavytskyi & Urazgaliyeva, 2018). More recent studies also suggest that AI-integrated educational technologies may foster student creativity and contribute to more interactive and supportive learning environments (Hwang et al., 2022).

While substantial research has been conducted on digital platforms in general education contexts, there is limited empirical evidence concerning their use in structured, professional education domains where high cognitive load and procedural knowledge are emphasized. One such domain is aviation education, which demands rapid information processing, strict adherence to safety protocols, and highly structured training environments. The insights drawn from such settings can inform broader applications in similarly intensive disciplines, such as engineering and healthcare. This study investigates the effectiveness of AI-integrated online platforms within a large-enrollment, introductory aviation course at a U.S. base university. In doing so, it contributes to the scholarship of teaching and learning by offering evidence-based insights into how digital platforms can enhance student engagement and learning experiences in classroom settings that present challenges for interactivity and personalization. The study further explores whether differences exist between students on distinct academic pathways. Specifically, between those training to become professional pilots and those pursuing aviation-related non-flight majors. The study seeks to answer the following questions:

Q1: How do students perceive the use of AI-integrated online learning platforms in their learning experience?

Q2: Which features best support in-class engagement and learning outcomes, and what improvements do students suggest?

Q3: Do pilot and non-pilot students perceive in-class online platforms differently?

Understanding the impact of AI-integrated online classroom platforms is critical for helping aviation educators make informed decisions about the adoption and integration of these technologies into their instructional practices. Given the distinct learning needs and performance expectations in aviation education, such insights are especially valuable for ensuring that technological tools align with pedagogical goals. Student feedback can offer practical guidance for the ongoing development and refinement of digital platforms, ensuring they are responsive to user needs and capable of enhancing both engagement and learning outcomes. Moreover, these findings may contribute to broader discussions on the role of AI in specialized professional education and inform future research and policy in this area.

The remainder of this paper is organized as follows. The next section reviews prior research on online learning platforms, the application of AI in education, and existing studies focused on aviation students. The Methodology section outlines the study context, describes the AI-integrated platform used, and details the survey instrument and data analysis procedures. The final sections present the findings and offer a discussion of the results in light of existing literature.

Literature Review

The adoption of digital learning platforms has become increasingly prominent in modern education, with a recent trend of incorporating AI-based functions (Ikedinachi et al., 2019; Luo & Hsiao-Chin, 2023). While the COVID-19 pandemic catalyzed significant growth in remote learning research, this study focuses on the use of digital tools in face-to-face classrooms settings. This section synthesizes current literature on digital learning technologies, their effectiveness in fostering engagement and learning experiences, and the role of AI-driven features in shaping modern educational practices.

Classroom Technology Tools and Student Engagement

Technology tools in the classroom have demonstrated the potential to increase student engagement, though their effects on academic performance and attendance remain less conclusive. For example, Young (2008) noted that while these tools enhance engagement, they do not consistently translate to improved grades or attendance, and their impact on self-study remains uncertain. Successful integration relies heavily on continuous teacher training and support. Interactive tools, such as those used in computer graphics education, can motivate students and reinforce learning. However, the Think-Pair-Share (TPS) model received mixed feedback, as many students preferred individual tasks, underscoring the need for strategic implementation (Schweitzer et al., 2011).

Several studies highlight the role of digital platforms in enhancing engagement. The Student Response System (SRS), for instance, significantly boosts classroom participation, although student preferences vary (Malandrino et al., 2014). Additionally, Classroom Assessment Techniques (CATs) also support instructional improvement and student satisfaction despite initial resistance to adopting new technologies (Byon, 2005).

Another commonly used category is digital learning platforms, which influence student engagement and activity differently. For example, Google Classroom has been linked to improved cognitive activity and motivation (Stavytskyi & Urazgaliyeva, 2018), while Quizizz, with its gamified interface, was favored for encouraging greater participation (Ramadhan, 2022). Similarly, platforms like Edmodo and Quipper promote independent learning and language skills practice, even though they sometimes face technical challenges such as slow internet speeds (Cakrawati, 2017).

While technology tools in the classroom improve motivation and engagement, their impact on academic performance and self-study effectiveness needs more exploration. Effective implementation relies on comprehensive teacher training and support and thoughtful

consideration of appropriate methodologies to maximize student engagement and learning outcomes.

Artificial Intelligence in Education

Ng et al. (2023) analyzed the evolution of AI in education over two decades, focusing on applications in teaching and learning. Key advancements include Intelligent Tutoring Systems (ITS), adaptive learning systems, natural language processing (NLP), learning analytics, and AI-driven robotics and virtual assistants. These tools support personalized learning, data-informed decision-making, and improved student engagement. Rincon-Flores et al. (2020) emphasized the promise of predictive analytics in enhancing outcomes, predicting individual student performance accurately remains challenging. Although AI seems good to both students and teachers, it should only complement rather than replace traditional teaching methods. while AI can enhance assessments and mentoring, it cannot substitute the human elements of teaching, such as character development and interpersonal communication (Fitria, 2021).

As AI tools are increasingly embedded in online learning platforms, a range of features that directly support teaching and learning are offering. These include automated summarization of student posts, intelligent tutoring systems, adaptive or personalized learning paths, chatbots and virtual assistants, real-time feedback mechanisms, and automated assessments (Chen et al., 2020; Zawacki-Richter et al., 2019). Collectively, such features can automate routine administrative tasks, reduce instructor workload, and enable personalized learning experiences that enhance system quality, information quality, and service quality (Hamzah et al., 2025). For instance, AI-powered assistants and chatbots can provide students with immediate support, although their success depends on proper training and ongoing support for both students and instructors (Chen et al., 2023; Singh & Hiran, 2022). Similarly, studies show that AI-generated learning materials and adaptive pathways foster deeper engagement, active learning, and improved knowledge retention, though barriers to adoption remain (Aluko et al., 2025). Within this broader landscape, our study underscores the role of AI-driven summarization, which helped students in a large lecture course quickly synthesize peer contributions from discussion boards. By condensing dozens of responses into concise takeaways, the summarization feature reduced cognitive load, improved accessibility of collective insights, and created new opportunities for active engagement with course material.

In addition, from the instructor’s perspective, AI tools also help to enhance teaching efficiency by providing personalized learning experiences and automating routine tasks, but challenges such as potential biases, low-quality information, and the risk of learner isolation need to be managed to ensure effective AI integration in education (Edali et al., 2024). Research also highlights that while AI systems can strengthen learner–instructor interactions and deliver in time and personalized support, they may raise concerns regarding responsibility, agency, and surveillance, pointing to the importance of explainability and human oversight (Seo et al., 2021). Thus, ethical considerations and teacher training are essential for effective implementation (Bozic, 2023). Involving teachers in the design process ensures AI tools meet their needs and enhances their willingness to integrate AI. Co-designing fosters a better understanding of AI's capabilities and limitations among educators (Nazaretsky et al., 2022). These points highlight that ethical and practical considerations are crucial for the successful adoption of AI in

education. The most existing studies on the integration of classroom technology tools and AI in education, such as those by Bozic (2023), Cakrawati (2017), and Singh & Hiran (2022), have explored the general educational landscape, highlighting the benefits and challenges of AI and digital platforms in primary, secondary, and higher education settings.

Personality and Cognitive Performance of Pilot Students

Within aviation education, the critical importance of safety in flight training has driven research on pilot students' personality traits, cognitive abilities, and learning styles, as well as the differences between pilot and non-pilot students.

Research has consistently shown that pilots exhibit distinct features compared to the general population. Pilot students tend to have superior stress management and cognitive performance. Dillinger et al. (2003) found that pilot students demonstrate enhanced stress-coping abilities and cognitive processing abilities distinguish them from non-pilots, while Barkhuizen et al. (2002) reported faster information processing and reaction times, with a classification accuracy of 92.3% distinguishing them from non-pilots.

Personality studies have revealed that pilot students score higher on Agreeableness and Conscientiousness compared to other traits (Gao & Kong, 2016). These traits reflect cooperation and task diligence. Neuroticism was the only trait showing a statistically significant difference between pilot and non-pilot groups, suggesting that pilots are generally more emotionally stable. Cognitive preference assessments using the Myers-Briggs Type Indicator (MBTI) show that pilot students often exhibit the ISTJ profile, favoring logical, structured problem-solving (Fussell et al., 2018). They also value collaboration and diverse perspectives in group settings.

Research into pilot students' learning styles has demonstrated that they prefer structured, systematic, and goal-oriented learning. The Kolb Learning Style Inventory identifies them as predominantly Converging and Assimilating learners, favoring abstract conceptualization and logical analysis (Gao et al., 2013; Kanske & Brewster, 2001). These preferences align with the rigorous and procedural nature of flight training. Reesman and Birdsong (2023) also emphasized that pilots benefit from visual and active learning strategies, reflecting their hands-on training environments.

In summary, integrating digital platforms and AI into classrooms can enhance learning efficiency and engagement when implemented with careful planning and sufficient support. However, in aviation education, particularly for pilot students, the structured and discipline-driven nature of training necessitates tailored learning technologies. Despite increasing interest in digital and AI-enhanced learning, there remains limited research on how these tools align with the unique cognitive and personality traits of aviation students. Few studies have examined how such platforms are perceived by pilot versus non-pilot students. This study aims to fill that gap by evaluating the impact of AI-driven classroom platforms in an introductory aviation course, offering insights into how these technologies can be optimized for aviation education.

Methodology

Research Setting

This study was conducted within the aviation department of a U.S. based university that offers a range of collegiate aviation programs, including flight, aeronautical engineering, unmanned aerial systems, and aviation management. The curriculum selected for this study is an introductory 3-credit hours course that is a required component across four undergraduate aviation programs. As a foundational course, it provides students with a broad overview of the aviation industry, covering its historical development, regulatory framework, and the roles of key stakeholders. By the end of the course, students are expected to develop a broad understanding of the aviation industry's historical development, connect past trends to contemporary challenges, and synthesize diverse sources of information to interpret critical topics in the field.

Major assessments in the course include ten online quizzes, three exams, and one group presentation. In addition, in-class activities conducted through the CampusKnot platform provided opportunities for extra credit. Prior to this study, the course primarily followed a traditional lecture-based format, with limited opportunities for student-driven or interactive learning, largely due to its enrollment size of more than 100 students per semester. This practical challenge made the course an ideal setting to investigate the impact of integrating active, technology-supported instructional strategies.

Students enrolled in the course primarily came from aviation-related programs, which diversely consist of both academic focus and technical experience. For the purposes of this study, students in the flight program who have received structured flight training are referred to as "pilot students". Those enrolled in other non-flight majors are categorized as "non-pilot students". This distinction allowed for a comparative analysis of how different career pathways may influence student engagement and perceptions of digital learning platforms.

CampusKnot Integration

Throughout the selected semester, we integrated a specific online learning platform, CampusKnot, into classroom activities to enhance class engagement and participation. CampusKnot is an AI-enhanced teaching assistant that helps faculty increase engagement by gathering real-time feedback and streamlining classroom interactions. From driving participation to eliminating the upkeep of engagement, Campusknot transforms the learning environment into an exciting hub of active student involvement. The platform offers a variety of features. Table 1 below outlines the primary functions, Polls and Feeds, and how they applied.

Table 1

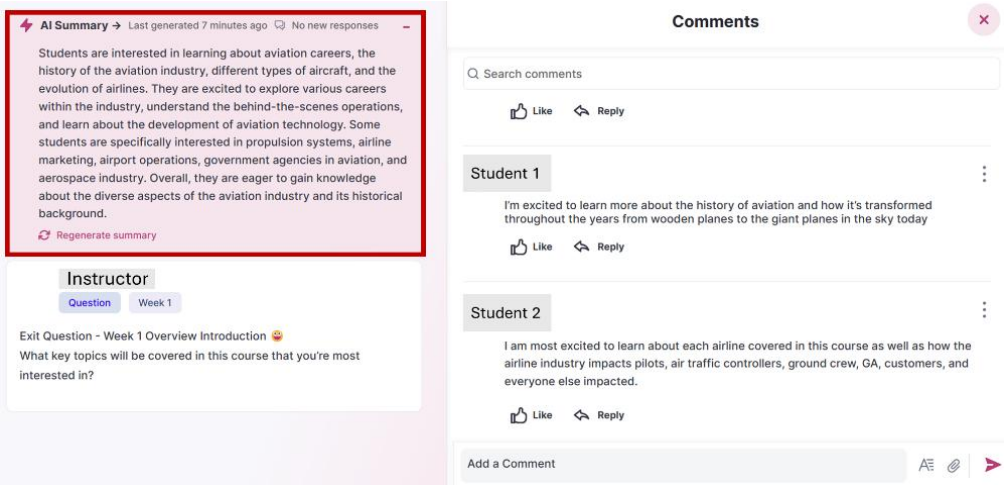
CampusKnot Functions for In-class Activities

Functions	Description
Polls	*Multiple-choice Questions:* Assess students' understanding of content in real time. *Open-ended Questions:* Encouraged deeper reflection and creative responses. *Word Cloud:* Captured a collective snapshot of students' perspectives.
Feeds	Served as a forum for students to post and reply to peers and instructors, promoting active discussion. Frequently used for lecture exit questions and reflection prompts. Included an AI-generated summary feature (see Figure 1).

The Polls feature engages students through multiple-choice and open-ended questions, helping assess prior knowledge and real-time understanding. An optional word cloud function helps to visualize common themes from student responses. Feeds functioned as a discussion forum where students could ask questions, share ideas, and reflect on lecture content, providing an outlet for those less comfortable speaking in class. They also featured an AI-generated summary tool (Figure 1), which offered concise recaps of student contributions.

Figure 1

AI Summary Function in Feed



Over the semester, 13 discussion prompts were posted through CampusKnot Feeds, align with lecture topics such as aviation careers, historical milestones, aircraft development, and general aviation, etc. These prompts invited students to comment on key ideas, connect concepts, and exchange perspectives with peers. Table 2 presents participation patterns from the first eight lectures that show consistently high levels of engagement. The AI summary function was particularly valuable in this large-class setting where the volume of responses could otherwise be challenging to synthesize.

Table 2

Summary of Student Discussion Board Activities (First Eight Lectures)

Lectures	Lecture / Discussion Prompt	Views	Comments
1	Overview & Introduction – key topics of interest	136	83
2	Aviation Careers – future career interests	121	73
3	Aviation Milestones – reflection discussion	112	23
4	Aircraft Development – favorite aircraft	101	54
5	Milestones of Airlines – key takeaways	95	43
6	Pan American Airways – reflection discussion	88	23
7	General Aviation – thoughts/questions	79	24
8	Aerospace Industry – reflection discussion	64	26

Survey Design and Data Collection

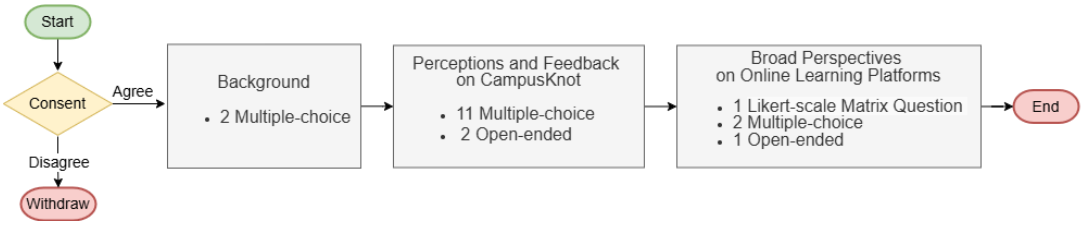
The survey instrument was developed using established design strategies informed by prior studies on student perceptions of online learning platforms, including but not limited to study of Cakrawati (2017), Byon (2005), and Ramadhan (2022), etc. Our survey include mixture of multiple question formats, including Likert-scale items, matrix questions, and open-ended questions. These widely used approaches is easy to measure levels of agreement or satisfaction, also capture nuanced attitudes and provide richer data for analysis and interpretation. To ensure content validity and clarity, the draft questionnaire was reviewed by two faculty experts in aviation education and two representatives from CampusKnot, the platform partner. The external reviewers brought extensive experience in education and technology, particularly in faculty onboarding, product feature testing, and classroom engagement strategies. Their feedback, together with the disciplinary expertise of aviation faculty, was instrumental in refining both the design and wording of survey items, ensuring the instrument was methodologically sound, research-based, and practically applicable.

We utilized a Qualtrics-based online survey to capture students' perceptions of CampusKnot and their broader attitudes toward online learning platforms. Participants were recruited from a course already using the CampusKnot platform, representing a convenience sample of enrolled students. An Institutional Review Board (IRB) approval was secured prior to conducting the survey. Students' participation was completely voluntary, and informed consent was obtained from all participants, and confidentiality is maintained by anonymizing data and securely storing materials.

Following consent, students provided background information such as their major and academic standing. The survey is divided into two main sections and took approximately 10–15 minutes to complete (Figure 2 illustrates the survey flow).

Figure 2

The Survey Flow



The first section of the survey examined students' classroom experiences using CampusKnot, assessing its perceived impact on engagement and learning outcomes. Students were asked about their motivation for participation, perceived benefits for engagement and academic performance, preferred platform features, and suggested improvements. This section consisted of multiple-choice and open-ended questions (Table 3 lists the questions in the first section).

Table 3

Survey Questions on Student Perceptions of CampusKnot

Category	No	Question
Overall Experience	Q2.1	How would you rate your overall experience using CampusKnot during this semester?
	Q2.2	How easy is it to navigate CampusKnot's interface and access its features?
Motivation	Q2.3	What are your primary reasons for participating in CampusKnot activities?
	Q2.4	How often do you participate in CampusKnot activities?
Features	Q2.5	What types of CampusKnot activities do you find most engaging?
	Q2.6	How do you feel about the "AI Summary" feature in the Feed discussions, which provides a summary of all the comments?
Learning Experience and Perceived Benefits	Q2.7	How do you feel that using CampusKnot influences your in-class learning experience?
	Q2.8	Has using CampusKnot motivated you to be more active in other areas beyond platform activities, such as participating in discussions, contributing to group projects, or reaching out for help?
	Q2.9	Do you feel that participating in activities on CampusKnot helps you better understand the course material?
	Q2.10	Do you think participating in CampusKnot activities positively influences your academic performance in this course (e.g., on quizzes and exams)?
Integration with Learning	Q2.11	Do you feel that CampusKnot (used for in-class activities) effectively complements Brightspace (used for quizzes, exams, and announcements)?

Management System		
Additional Feedback	Q2.12	What did you like the most about the CampusKnot activities and why?
	Q2.13	Any additional comments or feedback about CampusKnot?

The second section explored students' overall perceptions of digital learning tools beyond CampusKnot. It featured a 5-point Likert scale matrix designed to assess general attitudes, with response options ranging from "Strongly agree (5)" to "Strongly disagree (1)". Additional follow-up questions further gather insights into platform preferences and engagement. The responses from this matrix question enabled a comparative analysis of attitudes and experiences between pilot and non-pilot students, shedding light on how program affiliation may influence students' perception on digital learning engagement.

Data used in this study was collected through an online survey distributed at the end of the Fall 2024 semester, between November 13 and December 16, 2024, to all 147 students enrolled in the course. By the time of data collection, students had engaged with CampusKnot consistently, providing sufficient exposure to offer informed feedback. A total of 115 submissions were received, with a response rate of 78.2%. After filtering out incomplete responses, 109 valid responses remained, resulting in a validity rate of 94.7%.

Data Analysis

Qualitative Analysis

Qualitative coding is a systematic method used to analyze textual data by identifying key themes and patterns through labeled segments of information. This approach helps researchers organize unstructured responses while preserving the contextual depth of qualitative insights (Auerbach & Silverstein, 2003). The coding process can follow a deductive approach, where predefined codes are applied based on existing theories, or an inductive approach, where themes emerge directly from the data (Williams & Moser, 2019). Given its iterative nature, qualitative coding often involves multiple rounds of refinement to ensure accuracy and relevance (Elliott, 2018). Researchers may conduct coding manually or use qualitative analysis software such as NVivo or ATLAS.ti to manage large datasets efficiently. Regardless of the method, the interpretative nature of coding ensures that the process remains human-centered (Williams & Moser, 2019).

This study employs an inductive coding approach to analyze open-ended survey responses, allowing key themes to emerge naturally from student feedback. Qualitative data is first reviewed to identify recurring keywords related to the question's purpose, such as platform usability, influence on engagement level, and feature preferences. These initial codes are refined and categorized into broader themes, and the frequency at which particular themes appear is recorded. Given the moderate dataset size, manual coding was chosen to maintain deep engagement with the data while leveraging R for efficient frequency counting. This approach ensured that the textual data is systematically analyzed, offering a rigorous reflection of students' feedback about online learning platforms.

Quantitative Analysis

For multiple-choice questions, descriptive statistics are employed to provide a summary of the responses. Frequency distribution, means, and standard deviations were computed to assess overall patterns in student perceptions. Bar charts are utilized to visualize response patterns and facilitate an intuitive understanding of the data distribution.

To examine whether pilot and non-pilot students differ in their perceptions of online learning platforms (Q3.1, matrix question using the Likert scale), a Chi-square test is performed. This test assesses the association between two categorical variables by comparing observed and expected frequencies under the null hypothesis:

H_0: There is no association between student type (pilot students vs. non-pilot students) and their perceptions of online learning platforms.

The Chi-square statistic is calculated as:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

where O_i is the observed frequency of responses in each category and E_i is the expected frequency assuming no relationship (Rana & Singhal, 2015; Swinscow et al., 2002). Degrees of freedom (df) are computed as:

$$df = (r-1) \times (c-1)$$

where r is number of categories in one variable and c is the number of categories in the second variable. The resulting Chi-square value is then compared to a critical value with a statistical significance at α=0.05. If the calculated Chi-square value exceeds the critical value, the null hypothesis is rejected, indicating a significant association between student type and their perceptions of online learning platforms. Otherwise, the null hypothesis is retained, suggesting no meaningful relationship.

Results and Discussions

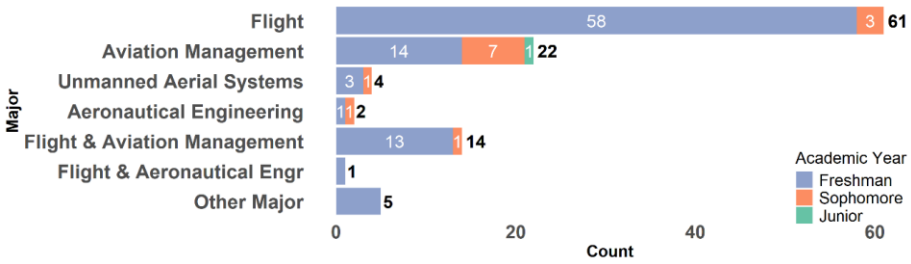
This section presents survey findings. Using descriptive statistics and thematic coding of open-ended responses, we first report participant demographics, examine student feedback on CampusKnot, compare perceptions between pilot and non-pilot students, and highlight student perspectives on the overall future role of AI related and desired platform features.

Demographics

The survey initially gathered background information from students. First-year students comprise the largest group, with 95 respondents (Figure 3). Sophomores account for a smaller proportion, with 13 participants, while Juniors have the least representation, with only one respondent. No Seniors participated in the survey.

Figure 3

Demographic of Survey Participants



Regarding majors, the majority of students are in aviation-related fields. The largest group of respondents comes from the flight program with 61 pilot students, followed by students from the aviation management. Fewer students came from the aeronautic engineering and unmanned aerial systems programs. Some participants working on double majors within aviation department, including flight along with aviation management or unmanned aerial systems, showed comparatively smaller distributions, mainly made up of Freshmen. Furthermore, 5 first-year students are from other departments, such as psychological science and exploration program.

Feedback about CampusKnot

The first part of the survey explores students' perceptions of using CampusKnot in class, covering various categories including overall experience, motivation, engagement with platform features, and perceived learning benefits. The final two questions let students share open-ended feedback, providing a deeper understanding of their experiences and potential areas for improvement.

Overall Experience

Regarding students' satisfaction with CampusKnot in class (Q2.1 & Q2.2), nearly 90% of students rate their overall experience as extremely or somewhat satisfied and find the interface and features easy to navigate. A small group of students expressed a neutral attitude, while only about 5% provided negative feedback regarding the platform's usability and overall experience. The specific concerns raised by this group will be addressed later in the open-ended responses.

Motivation

Given that we offer extra credit for some activities, one of our goals was to understand what motivates students to participate, whether they are primarily driven by extrinsic rewards or if other factors, such as enhancing learning, also play a role. Question 2.3 asks students about their motivations for using CampusKnot. There are 96.3% of respondents selected earning extra credit as their primary motivation, highlighting the strong influence of extrinsic incentives. Staying engaged with the class (48.6%) is the second most selected reason, followed by interacting with classmates or the instructor (22.0%) and reinforcing course material to deepen

understanding (20.2%). A smaller portion of students (8.3%) indicate personal interest in the topics.

Question 2.4 explores how frequently students use CampusKnot. About 27.5% reported participating almost every time the instructor posts a question, regardless of whether it offers extra credit. Another 34.9% said they primarily engage in activities that offer extra credit, though some also participated in non-credit activities that interested them. These findings suggest that while extra credit was the dominant motivator, many students are involved to fostering class engagement and enhancing learning experiences.

Features

As discussed earlier, various in-class activities were implemented with different objectives in mind, and the following questions examined which activities they found most compelling, as well as their perceptions of AI-powered features.

Question 2.5 shows that multiple-choice questions stand out as the most engaging activity, with 87.2% of students selecting this option, suggesting that students prefer quick assessment activities that offer instant responses. Discussion activities were the second most engaging (32.1%), followed by open-ended questions (21.1%) and word cloud activities (17.4%). These results indicate a strong preference for structured, concise prompts like multiple-choice questions, while a smaller but notable group values open-ended formats that encourage deeper interaction.

The feedback is mixed from responses about "AI Summary" function that automatically generates a summary of feed discussions (Question 2.6). A significant portion (33.9%) found it “very useful”, stating that it helped them quickly grasp the main points without reading through every comment. Another group (28.4%) considered it "somewhat useful", acknowledging its convenience but still preferring to review the entire discussion for added context. A smaller segment (7.3%) did not find the feature beneficial, expressing a preference for reading all comments themselves. Moreover, the remaining students reported being unaware of this function, suggesting that a portion of users may not fully explore the platform on their own and that more explicit guidance or demonstrations could improve adoption.

Learning Experience and Perceived Benefits

The following questions explore how the platform influences students’ classroom learning experiences and their perceptions of its impact on academic performance. Since actual grades are unavailable, the findings rely entirely on students’ self-reported experiences.

In terms of the platform’s effect on in-class learning experience (Question 2.7), the majority indicates that it has significantly or somewhat improved their learning experience (79.8%). Some students (20.2%) feel that it has had no impact, and no respondents feel it has negatively affected their learning. The role of CampusKnot in enhancing engagement beyond platform activities (Question 2.8), such as discussions, group work, or seeking help, is also worth considering. About 57.8% of students feel at least somewhat more motivated to participate in

these broader academic activities after using the platform, suggesting that its interactive features may encourage greater involvement beyond the structured tasks. On the other hand, a smaller group does not experience this effect (25.7%), indicating that while the platform supports engagement for many, its impact may depend on individual learning preferences and habits.

Regarding the effect on understanding course material (Question 2.9), most students (83.5%) strongly or somewhat agree that the platform's activities help them grasp the course more effectively. A smaller group of students (15.6%) remains neutral, while only one student disagrees with the helpfulness of the platform. A similar pattern can be observed in response to Question 2.10, which asks for the platform's influence on academic performance, including quizzes and exams. The majority of students believe it has a positive impact (78%). There are 18.3% respondents remain neutral, and 3.7% students express disagreement, indicating that while many find it beneficial, its effect on performance may vary based on individual study habits and learning preferences.

Effectiveness of Integration with Learning Management System

During the study period, CampusKnot was used exclusively for in-class activities, while Brightspace hosted all other materials and assessments. When asked about CampusKnot's effectiveness (Q2.11), 82.57% of students reported a positive experience, noting it enhanced their learning. However, 7.4% cited technical issues like lag and suggested improvements. Open-ended feedback (Table 4) praised interactive features like live polls but also reflected a desire for greater platform integration to streamline course access.

Table 4

Key Themes and Frequency of Open-ended Responses for Q2.11 " Do you feel that CampusKnot effectively complements Brightspace?"

Theme	Count	Example Quote
Technical Issues	7	"Sometimes it would lag, causing distraction."
Improve Engagement and Interactivity	4	"I found live poll effective and engages students."
Perceived Added Value	3	"Didn't feel like anything extra, though the extra credit was nice."
Integration Concerns	2	"I would be much more satisfied if Brightspace was used for everything."

Additional Feedback

The analysis of responses asking what students like most shows that students most frequently appreciated the platform's ability to enhance engagement and promote interactive learning, with 26 respondents emphasizing its role in fostering active participation (Table 5). They also value its ease of use and intuitive navigation, as mentioned by 21 respondents, underscoring the importance of a user-friendly interface. Additionally, 18 respondents noted that the platform effectively reinforced course material and provided valuable real-time feedback

through live polls, while external motivators such as extra credit were highlighted as key drivers of participation.

Table 5

Key Theme Frequency of Open-ended Responses for Q2.12 "What did you like the most about the CampusKnot activities and why?"

Theme	Coding Keywords	Count	Example Quote
Engagement & Interactive	Engage, interaction, fun, motivating, active learning, participation, immersive experience, class involvement	26	"Engagement features: Campus knot helps me to interact with instructor and other students."
Knowledge Reinforcement & Study Aid	Understand, learn, quiz, review, practice, apply knowledge, reinforce, study tool	18	"Helps reinforce some of the more important things we just learned."
Ease of Use & Intuitive Navigation	Easy to use, navigate, accessible, user-friendly, simple, clean, straightforward, modern, convenient, intuitive, interface	21	"Clean and user-friendly interface. Easy to navigate."
Live Polls & Real-Time Feedback	Live polls, pop-up, real-time, interactive questions, instant feedback, immediate results, gauge understanding	18	"To get real time feedback so that I can know whether I was correct or not right after I submit."
Extra Credit & Incentives	Extra credit, bonus, reward, incentive, earning points	17	"Live Polls. It is interesting to get extra credit and also know information."
Interaction with Classmates & Peer Collaboration	Responses, ideas, discussion, classmates, collaboration, peer feedback, shared insights	11	"I think learning more about my classmates' opinions was interesting."
Accessibility Across Multiple Devices	Cross-device, multiple platforms, anywhere access, available on the phone	1	"I liked that I could get it on many devices."

In response to the open-ended question (Q2.13) inviting any additional comments about CampusKnot, many students offered positive feedback, highlighting the platform's usefulness, interactivity, and ease of use. However, several students also raised concerns, particularly related to technical issues such as lag, slow loading, and connectivity problems. In addition, some respondents expressed a desire for better integration with the university's existing learning management system, Brightspace, to streamline their learning experience. Other suggestions

included interface improvements, such as the addition of a dark mode or more robust server capacity to handle higher user loads.

Table 6

Key Theme Frequency of Open-ended Responses for Q2.13 "Any additional comments or feedback about CampusKnot?"

Theme	Keywords	Count	Example Quote
Positive Feedback	Good, useful, positive, nice, love, like, great	10	"I like Campusknot."
Technical Issues	Lag, slow, connectivity, loading, server, WiFi	6	"Experienced connectivity issues throughout the class."
Integration with Brightspace	Brightspace, integrate, replacement	3	"It would be amazing if CampusKnot was (ever) integrated into Brightspace."
Suggestions & Improvements	Dark mode, improve, new feature	2	"Need a better server to hold more students online at the same time. And UI needs improvement."

General Perception of In-class Online Learning Platforms

The second part of the survey focused on students' general perceptions of in-class online learning platforms. A Likert-scale matrix question (Table 7) using a 5-point Likert scale to assess various dimensions of the online platform's influence on the learning experience, including engagement, focus, motivation, understanding of course material, confidence in subject knowledge, anticipated academic impact, and discussion participation.

To compare the differences between pilot and non-pilot students, Chi-square tests were performed on each sub-question. For consistency, students pursuing a double major or belonging to other majors are excluded from this analysis. Although the Likert-scale data are ordinal, the chi-square tests provided valuable insights into whether the distribution of responses differed significantly between the two groups. Table 7 below summarizes the descriptive statistics (mean and standard deviation) for both pilot and non-pilot students, as well as the chi-square test results for eight sub-questions.

For most of the sub-questions, the descriptive statistics indicated similar central tendencies between the groups. With mean ratings generally above four, indicating positive experiences with online learning platforms. Pilot students tend to have higher scores with higher standard deviation, indicating that pilot students tend to have overall higher recognition but more different perceptions about online platforms used in class.

The Chi-square tests suggest that there are no statistically significant differences between both groups for all the statements we asked. Both pilot and non-pilot students have similar positive perceptions of in-class online learning platforms.

Table 7

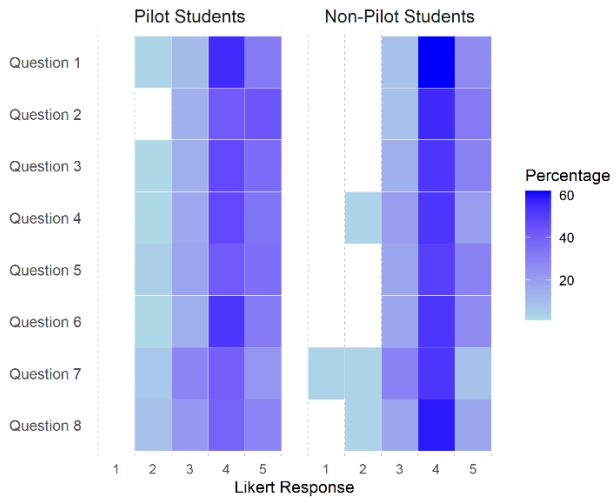
Student Perceptions of the Usage of In-class Online Platforms (Q3.1)

No	Question	Pilot Students (Mean± SD)	Non-pilot Students (Mean± SD)	χ^2 Statistic	P value
1	Using an online learning platform during class usually makes me feel more engaged in the course content.	4.16 ± 0.71	4.18 ± 0.58	1.34	0.72
2	I find it easier to stay focused during class when interactive online activities are used.	4.29 ± 0.71	4.24 ± 0.61	2.28	0.32
3	I feel more motivated to participate in class when interactive activities are available online.	4.20 ± 0.73	4.15 ± 0.67	0.96	0.81
4	Online activities in class often enhance my understanding of the course material.	4.14 ± 0.74	3.94 ± 0.75	2.10	0.55
5	I feel more confident in my knowledge of the course material when I regularly participate in online platform activities.	4.09 ± 0.84	4.12 ± 0.70	1.94	0.58
6	I believe participating in activities on online platforms will positively influence my academic performance.	4.14 ± 0.71	4.09 ± 0.68	0.79	0.85
7	Online learning platforms make it easier for me to connect with other students and the instructor.	3.82 ± 0.88	3.64 ± 0.82	6.36	0.17
8	Online learning platforms encourage me to engage in discussions or ask questions that I may not participate in otherwise.	3.88 ± 0.94	3.94 ± 0.70	4.67	0.19

Although the Chi-square results indicate no statistically significant difference between the two groups at the α=0.05 level, the p-value of Questions 7 and 8 is the lowest, suggesting notable discrepancies between pilot and non-pilot students. To provide a clearer comparison, Figure 4 illustrates the percentage distribution of responses for each sub-question. Notably, more pilot students reported that online learning platforms encouraged them to connect with others and participate in discussions they might otherwise avoid. This suggests that pilot students may place greater value on the social and collaborative features of online platforms. This finding aligns with existing literature highlighting pilot students' distinct personality traits and preferences, such as a tendency toward teamwork and collaborative problem-solving (Fussell et al., 2018; Gao et al., 2013). Although overall perceptions are similar across groups, this subtle difference may reflect the communicative demands of pilot training.

Figure 4

Heatmap of Likert Responses by Student Group (Percentage)

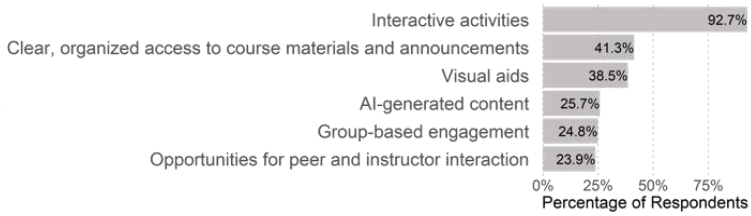


These findings imply that the benefits associated with these platforms, such as increased engagement, focus, and a positive impact on academic performance, are recognized broadly among aviation students, regardless of their pilot experience. Since both groups showed comparable attitudes, educational institutions can be more confident that introducing online learning platforms across various courses will likely be well received.

We then examined activities and features students find most beneficial for enhancing learning and academic performance. Students rated interactive activities as highly effective, such as live polls and activities that can offer real-time feedback. Followed by clear, organized access to course materials and visual aids. Also, students have expressed interest in AI-powered functionalities, highlighting their curiosity and need for such features.

Figure 5

Responses to Q3.2 "Which online activities and features do you consider most effective in enhancing your learning and academic performance?"

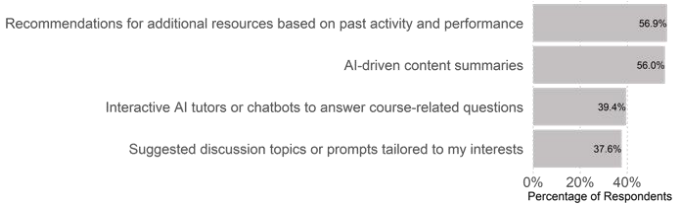


To further narrow the scope of AI-related functions, our focus shifted to AI-driven features not yet offered this semester. CampusKnot already provides several AI-driven tools, such as word cloud live polls, AI-generated summaries of discussion boards, and AI-created quizzes for instructors. Some additional students show the most interest in future enhancements,

like personalized AI recommendations for study materials based on individual performance and AI-driven summaries of lectures or reading materials. Developers might also consider integrating conversational AI tutors for real-time support and tailored assistance with specific academic topics, which also appeal to the student body.

Figure 6

Responses to Q3.3 "If CampusKnot or other platforms offered more AI-based features, I would find the following most helpful."



To gain broader insights, we lastly included an open-ended question asking students what additional features a learning platform like CampusKnot should offer. Students have suggested additional functionalities that could further enhance their learning experience on in-class online platforms like CampusKnot. The following Table 8 summarizes the key functions students mentioned in their open-ended responses, categorizing them by feature type and the number of times they were suggested by survey respondents.

Table 8

Summary of Key Functions Suggestion from Q3.4 "What kind of features do you think a learning platform like CampusKnot should have to support the student learning experience"

Feature Category	Count	Functionality Suggestions
AI-Powered Features	28	AI summaries of lectures, AI summaries of question responses, AI-generated practice quizzes, AI chatbot, AI study suggestions, AI-suggested resources
Study & Review Tools	15	Practice quizzes and exams, questions record history, answer explanations, link to other supplemental resources
Communication & Collaboration	11	Line to communicate with instructors and students
Interactive Learning	10	Group activities, group discussions
Integration with Brightspace	2	Brightspace integration, syncing quizzes with slides, reviewable responses
Privacy & Anonymity	2	Option to hide names in discussions, anonymous question submissions
Personalization	1	Personalized resources

Among the most requested features, AI-powered enhancements receive the highest number of mentions, including AI summaries of lecture content, AI-generated practice quizzes, and AI-driven study suggestions. Study and review tools are also frequently highlighted, with students requesting the ability to review past questions, practice exams, and answer explanations to reinforce their understanding. Additionally, students highlight that a dedicated messaging system to facilitate student-instructor communication is necessary. Interactive learning enhancements, such as group discussions and group-based activities, are also noted.

A few students expressed interest in better integration with Brightspace, suggesting features like syncing quizzes with lecture slides and reviewing past responses more easily. Concerns about privacy and anonymity were raised, with students requesting options to hide their names in discussions or submit responses anonymously. Finally, one student suggested personalized learning resources that adapt to incorrect quiz answers, providing targeted study materials based on individual performance.

Conclusion

By integrating CampusKnot into an introductory aviation course, this study investigated the impact of online learning platforms on student engagement and perceived learning outcomes. The findings indicate that most students see online learning platforms positively, particularly valuing features that provide immediate feedback and active participation opportunities. Live polling and multiple-choice are reported as especially engaging activities, highlighting the importance of immediate feedback and low-stakes assessments in fostering interaction in large classroom settings. While external motivation, like extra credit, played a significant role in driving participation, many students still appreciated the platform for reinforcing course material and stimulating peer interaction.

The AI-driven automated discussion summary function received mixed feedback. Some students recognize it as a valuable tool for synthesizing discussion points and valuing its concise recaps, while others prefer to review entire posts individually. On the other hand, from an instructional perspective, the summarization feature provided clear benefits. It reduced the time required to monitor lengthy discussion threads, highlighted recurring themes and misconceptions more efficiently, and allowed the instructor to deliver more timely and targeted feedback. In large-enrollment courses, where the sheer volume of posts can be overwhelming, this functionality proved particularly useful for maintaining oversight of student interactions. In addition, the platform also provides additional AI-enabled teaching tools, such as an AI Question Generator, which assists instructors in creating quiz questions directly from lecture notes, providing closer alignment between instructional materials and formative evaluation. Together, the AI-powered features demonstrate the dual potential of enhancing student engagement while simultaneously supporting instructional efficiency.

Although this study does not provide direct evidence linking platform usage to measurable academic performance, students' self-reported experiences suggest that these tools enhance their engagement in class and help contribute to improved comprehension and learning outcomes. Moreover, the dual utility of AI features—supporting both student learning and

instructor efficiency—highlights the potential for thoughtfully integrated online platforms to enrich teaching and learning in higher education.

Beyond the platform we used in class, students show a consistent positive attitude about adopting similar online platforms in the classroom regardless of discipline. Despite extensive literature that has mentioned pilot students' unique personalities and learning styles, statistical analysis revealed no significant differences in their overall perception of digital learning tools compared to non-pilot students. Nevertheless, pilot students expressed a slightly stronger belief that these platforms help build connections with peers and instructors and encourage discussion participation. This suggests that while digital tools benefit the broader student population, they may also cater to specific engagement preferences among pilot students, particularly those related to structured interaction and collaborative learning.

Based on student feedback, several practical recommendations emerge for educators and platform developers. Enhancing the user experience through improved real-time feedback, anonymous posting options, and seamless integration with learning management systems such as Brightspace could increase adoption and effectiveness. Additionally, students expressed strong interest in adopting more AI-driven functionalities, including automated lecture summaries, chatbots for instant support, adaptive practice quizzes, personalized study suggestions, and AI-recommended learning resources. Thus, platform developers may consider further personalizing learning features that support knowledge retention and provide students with on-demand assistance tailored to their needs.

More broadly, this research contributes to higher education pedagogy by demonstrating that AI-enhanced learning platforms can serve as effective instructional support even in content-intensive, high-enrollment settings. Educators across disciplines may benefit from incorporating similar tools to foster engagement and accommodate varied learning preferences. For platform developers and instructional designers, the results highlight students' interest in further AI-powered features such as personalized study resources, automated summaries, and enhanced system integration.

Despite the insights gained, this study has several limitations. First, the findings are derived from a single course within one aviation program, which may restrict the generalizability of results across disciplines and institutional types. However, aviation education offers a compelling example of a high-responsibility, procedural learning environment, and the insights gained here may be applicable to other structured professional education contexts, such as healthcare, business, and engineering. Second, while the study captures rich student feedback on perceptions and engagement, it relies primarily on self-reported survey data. This approach may introduce subjectivity and social desirability bias. Future research should incorporate objective performance indicators—such as assessment scores or participation analytics—to triangulate findings and more robustly evaluate learning outcomes. Lastly, although the comparative analysis between pilot and non-pilot students yielded valuable insights, a more balanced representation across academic levels and majors would enhance the depth of subgroup comparisons.

As universities continue to innovate in teaching and learning practices, especially in the face of growing class sizes and diverse learner needs, this study underscores the value of evidence-based, student-centered approaches to technology integration in higher education. Continued research and innovation in this field will help educators and platform developers leverage digital tools to effectively support meaningful learning experiences for students.

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References

Aluko, H. A., Aluko, A., Offiah, G. A., Ogunjimi, F., Aluko, A. O., Alalade, F. M., Ogeze Ukeje, I., & Nwani, C. H. (2025). Exploring the effectiveness of AI-generated learning materials in facilitating active learning strategies and knowledge retention in higher education. *International Journal of Organizational Analysis*. https://doi.org/10.1108/IJOA-07-2024-4632

Auerbach, C., & Silverstein, L. B. (2003). *Qualitative data: An introduction to coding and analysis* (Vol. 21). NYU press.

Barkhuizen, W., Schepers, J., & Coetzee, J. (2002). Rate of information processing and reaction time of aircraft pilots and non-pilots. *SA Journal of Industrial Psychology*, *28*(2). https://doi.org/10.4102/sajip.v28i2.53

Bozic, V. (2023). *The Use of Digital Tools and AI in Education*. https://doi.org/10.13140/RG.2.2.13438.87363

Byon, A. S. (2005). Classroom Assessment Tools and Students' Affective Stances: KFL Classroom Settings. *Language and Education*, *19*(3), 173–193. https://doi.org/10.1080/09500780508668673

Cakrawati, L. M. (2017). Students' perceptions on the use of online learning platforms in EFL classroom. *English Language Teaching and Technology Journal*, *1*(1), 22–30.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access*, *8*, 75264–75278.

Chen, Y., Jensen, S., Albert, L. J., Gupta, S., & Lee, T. (2023). Artificial Intelligence (AI) Student Assistants in the Classroom: Designing Chatbots to Support Student Success. *Information Systems Frontiers*, *25*(1), 161–182. https://doi.org/10.1007/s10796-022-10291-4

Dillinger, T. G., Wiegmann, D. A., & Taneja, N. (2003). Relating personality with stress coping strategies among student pilots in a collegiate flight training program. *12th International Symposium on Aviation Psychology, 2003University of Illinois, Urbana-Champaign*. https://api.semanticscholar.org/CorpusID:107559996

Edali, M., Saad, H., & Elkamel, A. (2024). Using Generated Artificial Intelligence (AI) Educational Tools for Enhancing Classroom Teaching Efficiency. *African Journal of Advanced Pure and Applied Sciences (AJAPAS)*, 512–523.

Elliott, V. (2018). Thinking about the coding process in qualitative data analysis. *Qualitative Report*, *23*(11). https://doi.org/10.46743/2160-3715/2018.3560

Fitria, T. N. (2021). Artificial intelligence (AI) in education: Using AI tools for teaching and learning process. *Prosiding Seminar Nasional & Call for Paper STIE AAS*, *4*(1), 134–147.

Fussell, S., Dattel, A., & Mullins, K. (2018). Personality Types and Learning Styles of Collegiate Aviation Students. *International Journal of Aviation, Aeronautics, and Aerospace*. https://doi.org/10.15394/ijaaa.2018.1223

Gao, Y., Au, K. T. S., Kwon, H. J., & Leong, E. W. (2013). Learning Styles of Australian Aviation Students: An Assessment of the Impact of Culture. *Collegiate Aviation Review International*, *31*(1). https://doi.org/10.22488/okstate.18.100435

Gao, Y., & Kong, S. (2016). Personality types of pilot students: A study of an Australian collegiate aviation program. *International Journal of Aviation, Aeronautics, and Aerospace*, *3*(3), 6. https://doi.org/10.15394/IJAAA.2016.1130

Guppy, N., Verpoorten, D., Boud, D., Lin, L., Tai, J., & Bartolic, S. (2022). The post-COVID-19 future of digital learning in higher education: Views from educators, students, and other professionals in six countries. *British Journal of Educational Technology*, *53*(6), 1750–1765. https://doi.org/10.1111/bjet.13212

Hamzah, H. A., Abu Seman, M. S., & Ahmed, M. (2025). The impact of artificial intelligence in enhancing online learning platform effectiveness in higher education. *Information Development*, 02666669251315842.

Hwang, G.-J., Tu, Y.-F., & Tang, K.-Y. (2022). AI in online-learning research: Visualizing and interpreting the journal publications from 1997 to 2019. *International Review of Research in Open and Distributed Learning*, *23*(1), 104–130. https://doi.org/10.19173/irrodl.v23i1.6319

Ikedinachi, A., Misra, S., Assibong, P. A., Olu-Owolabi, E. F., Maskeliūnas, R., & Damasevicius, R. (2019). Artificial intelligence, smart classrooms and online education in the 21st century: Implications for human development. *Journal of Cases on Information Technology (JCIT)*, *21*(3), 66–79. https://doi.org/10.4018/JCIT.2019070105

Kanske, C. A., & Brewster, L. T. (2001). The Learning Styles of College Aviation Students. *Collegiate Aviation Review International*, *19*(1). https://doi.org/10.22488/okstate.18.100298

Luo, Q. Z., & Hsiao-Chin, L. Y. (2023). The influence of AI-powered adaptive learning platforms on student performance in Chinese classrooms. *Journal of Education*, *6*(3), 1–12. https://doi.org/10.53819/81018102t4181

Malandrino, D., Manno, I., Palmieri, G., Scarano, V., & Filatrella, G. (2014). How quiz-based tools can improve students' engagement and participation in the classroom. *2014 International Conference on Collaboration Technologies and Systems (CTS)*, 379–386. https://doi.org/10.1109/CTS.2014.6867592

Nazaretsky, T., Bar, C., Walter, M., & Alexandron, G. (2022). Empowering teachers with AI: Co-designing a learning analytics tool for personalized instruction in the science classroom. *LAK22: 12th International Learning Analytics and Knowledge Conference*, 1–12. https://doi.org/10.1145/3506860.3506861

Ng, D. T. K., Lee, M., Tan, R. J. Y., Hu, X., Downie, J. S., & Chu, S. K. W. (2023). A review of AI teaching and learning from 2000 to 2020. *Education and Information Technologies*, *28*(7), 8445–8501. https://doi.org/10.1007/s10639-022-11491-w

Ramadhan, C. (2022). The Analysis of Digital Learning Platforms Use in EFL Learning. *Jurnal Literasi Digital*, *2*(2), 139–144. https://doi.org/10.54065/jld.2.2.2022.230

Rana, R., & Singhal, R. (2015). Chi-square test and its application in hypothesis testing. *Journal of the Practice of Cardiovascular Sciences*, *1*(1), 69–71. https://doi.org/10.4103/2395-5414.157577

Reesman, K., & Birdsong, J. (2023). Do Different Learning Style Inventories Report Similar Findings Among Pilots? *Collegiate Aviation Review International*, *41*(1). https://doi.org/10.22488/okstate.23.100235

Rincon-Flores, E. G., Lopez-Camacho, E., Mena, J., & Lopez, O. O. (2020). Predicting academic performance with Artificial Intelligence (AI), a new tool for teachers and students. *2020 IEEE Global Engineering Education Conference (EDUCON)*, 1049–1054. https://doi.org/10.1109/EDUCON45650.2020.9125141

Schweitzer, D., Boleng, J., & Scharff, L. (2011). Interactive tools in the graphics classroom. *Proceedings of the 16th Annual Joint Conference on Innovation and Technology in Computer Science Education*, 113–117. https://doi.org/10.1145/1999747.1999781

Seo, K., Tang, J., Roll, I., Fels, S., & Yoon, D. (2021). The impact of artificial intelligence on learner–instructor interaction in online learning. *International Journal of Educational Technology in Higher Education*, *18*(1), 54.

Singh, S. V., & Hiran, K. K. (2022). The impact of AI on teaching and learning in higher education technology. *Journal of Higher Education Theory and Practice*, *22*(13). https://doi.org/10.33423/jhetp.v22i13.5514

Stavytskyi, O., & Urazgaliyeva, M. (2018). Using Google Classroom tools in teaching students of economic specialities. *Advanced Education*, 76–81.

Swinscow, T. D. V., Campbell, M. J., & others. (2002). *Statistics at square one*. Bmj London.

Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, *15*(1), 45–55.

Young, R. (2008). *Using technology tools in the public school classroom*.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators? *International Journal of Educational Technology in Higher Education*, *16*(1), 1–27.

APPENDIX A

CampusKnot Feedback and Online Learning Platforms Survey

Start of Block: Consent

Research Participant Information Sheet

- ○ By checking this box, I agree to take part in this research. I am 18 years of age or older and understand the information above about my participation.

End of Block: Consent

Start of Block: Demographic

Q1.1 What is your current academic year?

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior

Q1.2 What is your major? (select all that apply)

- ☐ Prof Flight Technology
- ☐ Aviation Management
- ☐ Unmanned Aerial Systems
- ☐ Aeronautic Engr Technology
- ☐ Other, or multiple majors or minor, please specify:
  _____

End of Block: Demographic

Start of Block: CampusKnot-Specific Questions

Q2.1 How would you rate your overall experience using CampusKnot during this semester?

- ○ Extremely satisfied
- ○ Somewhat satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Somewhat dissatisfied
- ○ Extremely dissatisfied

Q2.2 How easy is it to navigate CampusKnot's interface and access its features?

- ○ Extremely easy
- ○ Somewhat easy
- ○ Neither easy nor difficult
- ○ Somewhat difficult
- ○ Extremely difficult

Q2.3 What are your primary reasons for participating in CampusKnot activities? (select all that apply)

- ☐ To earn extra credit
- ☐ To reinforce course material and deepen understanding
- ☐ To stay engaged with the class
- ☐ To interact with classmates or the instructor
- ☐ For personal interest in the topics
- ☐ Other, please specify: _____

Q2.4 How often did you participate in CampusKnot activities?

- ○ Almost every time the instructor posted a question, regardless of whether it earned points
- ○ Participated in all activities with extra credit and some non-credit ones if they interested me
- ○ Only for activities that earned extra credit
- ○ Rarely

Q2.5 What types of CampusKnot activities do you find most engaging? (select all that apply)

- ☐ Discussion
- ☐ Multiple-choice questions
- ☐ Open-ended questions
- ☐ Word cloud

Q2.6 How do you feel about the "AI Summary" feature in the Feed discussions, which provides a summary of all the comments? (Shown in the red frame in the image)

- ○ I find it very useful; it helps me understand the main points quickly
- ○ It's somewhat useful, but I prefer reading the full discussion
- ○ I don't find it useful and prefer to review all comments myself
- ○ I am not familiar with this feature
- ○ Other, please specify: _____

Q2.7 How do you feel that using CampusKnot influences your in-class learning experience?

- ○ Significantly improved
- ○ Somewhat improved
- ○ No change
- ○ Somewhat worsened. Please specify: _____
- ○ Significantly worsened. Please specify: _____

Q2.8 Has using CampusKnot motivated you to be more active in other areas beyond platform activities, such as participating in discussions, contributing to group projects, or reaching out for help?

- ○ Definitely yes
- ○ Probably yes
- ○ Might or might not
- ○ Probably not
- ○ Definitely not

Q2.9 Do you feel that participating in activities on CampusKnot helps you better understand AT10200 course material?

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

Q2.10 Do you think participating in CampusKnot activities positively influences your academic performance in this course (e.g., on quizzes and exams)?

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

Q2.11 Do you feel that CampusKnot (used for in-class activities) effectively complements Brightspace (used for quizzes, exams, and announcements)?

- ○ They work seamlessly and enhance my learning experience
- ○ They are effective but could be improved. Please specify: _____
- ○ I don’t notice a significant difference in my experience. Please specify: _____
- ○ It causes some confusion or difficulty. Please specify: _____
- ○ The integration negatively impacts my learning experience. Please specify: _____

Q2.12 What did you like the most about the CampusKnot activities and why? (e.g., features, ease of use, engagement, etc.) _____

Q2.13 Any additional comments or feedback about CampusKnot? _____

End of Block: CampusKnot-Specific Questions

Start of Block: General Questions about Online Learning Platform

Q3.1 Please indicate how much you agree or disagree with the following statements about using online learning platforms in class.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
(1) Using an online learning platform during class usually makes me feel more engaged in the course content.	○	○	○	○	○
(2) I find it easier to stay focused during class when interactive online activities are used.	○	○	○	○	○
(3) I feel more motivated to participate in class when interactive activities are available online.	○	○	○	○	○
(4) Online activities in class often enhance my understanding of the course material.	○	○	○	○	○
(5) I feel more confident in my knowledge of the course material when I regularly participate in online platform activities.	○	○	○	○	○
(6) I believe participating in activities on online platforms will positively influence my academic performance.	○	○	○	○	○
(7) Online learning platforms make it easier for me to connect with other students and the instructor.	○	○	○	○	○
(8) Online learning platforms encourage me to engage in discussions or ask questions that I may not participate in otherwise.	○	○	○	○	○

Q3.2 Which online activities and features do you consider most effective in enhancing your learning and academic performance? (select all that apply)

- ☐ Interactive activities (live polls, quizzes, real-time feedback on responses)
- ☐ Group-based engagement (interactive discussions, small group work, breakout sessions)
- ☐ Visual aids (videos, infographics, etc.)
- ☐ AI-generated content (summaries, personalized study tools)
- ☐ Opportunities for peer and instructor interaction
- ☐ Clear, organized access to course materials and announcements
- ☐ Other, please specify: _____

Q3.3 If CampusKnot or other platforms offered more AI-based features, I would find the following most helpful: (select all that apply)

- ☐ Recommendations for additional resources based on past activity and performance
- ☐ AI-driven content summaries (e.g., lecture summaries or reading material overviews)
- ☐ Suggested discussion topics or prompts tailored to my interests
- ☐ Interactive AI tutors or chatbots to answer course-related questions
- ☐ Other, please specify: _____

Q3.4 What kind of features do you think a learning platform like CampusKnot should have to support the student learning experience? Are they currently supported by CampusKnot?

_____

End of Block: General Questions about Online Learning Platform

End of the Survey