

April 2022

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Recommended Citation

Bosman, L., Kotla, B., Cuesta, C., & Duhan, N. (2022). Integrating Intercultural Communication Competence into Entrepreneurially-Minded Online Discussions. *The Journal of Advancing Education Practice*, 3(1). <https://openriver.winona.edu/jaep/vol3/iss1/5>

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Integrating Intercultural Communication Competence into Entrepreneurially-Minded Online Discussions

Abstract: The continued rise of the global economy, especially during COVID-19, has required stakeholders, including higher education, to think more strategically about preparing future university graduates with intercultural skill development. This study contributes to the literature by showing one approach whereby faculty can integrate intercultural communication competence into the STEM classroom via entrepreneurially-minded online discussions (a form of information literacy). This semester-long study applied a mixed methods approach. First, students participated in five online discussions, which were analyzed qualitatively to identify themes and patterns. Second, at the end of the semester, after completing the online discussions, students responded to a survey assessing their perceptions related to student learning and student satisfaction. The findings show that student perceptions of information literacy were high. Moreover, themes identified within the online discussions align well with the traditional communication process. Integrating intercultural competence into entrepreneurially-minded online discussions within the STEM classroom can be seen as “low hanging fruit” in that the return on investment for faculty is very high (i.e., requires minimal lecture time and promotes optimal connections to the real world).

Key Words: Intercultural, Online learning, Discussions, Entrepreneurship, 21st Century

1. Introduction

1.1 Problem Identification

The continued rise of the global economy, especially during the COVID-19 period, has required governments, organizations, and higher education institutions to think more strategically about skill development around diversity, equity, and inclusion (DEI) and intercultural competency efforts (Irving, 2010). In response, many programs have been instituted over the last several decades. The Global Leadership and Organizational Behavior Effectiveness (GLOBE) Project, started in the 1990s by researchers at the Wharton School of Business at the University of Pennsylvania, is a large-scale study with over 200 researchers from 62 countries. The project studies and disseminates knowledge related to the complex associations between culture, leadership effectiveness, and organizational practices (Dorfman, Javidan, Hanges, Dastmalchian, & House, 2012). A few decades later, the Association of American Colleges and Universities (AAC&U) followed suit by establishing the Valid Assessment of Learning in Undergraduate Education (VALUE) Rubric Development Project, which provides definitions and rubrics for sixteen learning outcomes required of all college and university graduates to be successful in the workforce, citizenship, and one's personal life. One of these learning outcomes, or competencies, is the Intercultural Knowledge and Competence VALUE Rubric that includes six dimensions of (1) cultural self-awareness, (2) knowledge of cultural worldview frameworks, (3) empathy, (4) verbal and non-verbal communication, (5) curiosity, and (6) openness (Association of American Colleges and Universities (AAC&U), 2009).

These projects and more lay a great foundation for understanding and assessing intercultural competence, yet, more work needs to be done in the science, technology, engineering, and math (STEM) disciplinary fields, which is known to be one of the least diverse disciplinary areas throughout the workforce and across university campuses (Byars-Winston, 2014; Whittaker & Montgomery, 2012). From a workforce perspective, a significant number of organizations described the lack of diverse and basic skills in recent STEM college graduates (Society for Human Resource Management, 2016). In response, industries, including aviation and health, have invested millions of dollars and large amounts of time in developing and delivering additional training related to crew resource management (to overcome potential human error leading to harmful and deadly effects). As an example, one organization disbursed \$3.6 million between July 2010 and July 2013 to provide crew resource management training to 3000 system-wide employees (Moffatt-Bruce et al., 2017). From a university perspective, STEM coursework provides plenty of theory, unsparing content, and equations, but typically provides limited opportunities for developing professional skills, such as intercultural

competence, which is extremely important as the STEM workforce is a key driver of entrepreneurial and economic endeavors through manufacturing and new product development (L. Bosman & Fernhaber, 2019). However, a survey of educators suggests that a major challenge with integrating intercultural competence in STEM higher education is due to knowledge gaps and limited experience around instructional design (López-Rocha, 2021).

1.2 Current Approaches to the Problem and Gaps

Several approaches have been used within higher education institutions to increase student professional skill development in intercultural competence. First, many higher education institutes offer study abroad programs that improve professional skill development by promoting cultural sensitivity, encouraging tolerance for ambiguity, and increasing self-confidence towards interacting with individuals from different cultures (Di Pietro, 2015). Second, many higher education institutions offer a minor in globalization, leadership, and global learning, to name a few; these programs typically aim to increase professional skill development related to multicultural diversity, economic interdependency and consider implications from multiple levels included individual, organization, societal, and cultural (Rochester Institute of Technology, 2021). Third, the Fulbright program (sponsored by the U.S. Bureau of Educational and Cultural Affairs) covers the expenses for students and faculty to participate in an immersive cultural experience whereby students participate in university programming and faculty work as visiting instructors; the main benefit of this program is increasing the interconnectedness and globalization of higher education (Kaniuka, 2019). Fourth, the National Science Foundation (which is the U.S. government's largest funder of academic research and development initiatives) requires all grant proposals to include a section on "broadening participation." This can aid in driving intercultural opportunities in that all proposals must highlight the proposed project's efforts towards preparing a diverse STEM workforce by expanding research access and outreach opportunities to underrepresented groups (James & Singer, 2016).

These are all great efforts, yet gaps remain. With respect to participating in study abroad programs or enrolling in a minor, this requires additional resources on behalf of students and university administration. Students may face financial concerns because of the high direct cost of program participation which includes both tuition and travel (in most cases). Moreover, due to the time commitment, students may find it challenging to take time off from work to focus on program requirements and/or take time away from their core academic focus areas. In addition, students who have family obligations may be deterred from participating based on the increased resource requirement (e.g., time, money, and energy), as they may not receive family support. University administration may also find

implementing study abroad programs and offering minors a challenge due to increased administrative burdens, limited resources, and lack of return on investment. Government-sponsored programs, such as Fulbright and the National Science Foundation broadening participation initiatives, come at a high cost. In 2007, the U.S. Congress passed the Paul Simon Study Abroad Foundation Act, which allocates \$80 million per year into study abroad education programs (Taylor & Rivera Jr, 2011). In addition, in 2015, the National Science Foundation requested \$823.03 million to support the development and delivery of broadening participation efforts (James & Singer, 2016).

1.3 Proposed Contribution to Literature

This study aims to contribute to the literature by responding to the problem identified above through integrating intercultural communication competence into entrepreneurially-minded online discussions. This study was conducted in response to COVID-19, which required switching to an online learning environment. *Why the entrepreneurial mindset?* The entrepreneurial mindset, defined as the “inclination to discover, evaluate, and exploit opportunities” (L. Bosman & Fernhaber, 2018), has demonstrated increased efficacy, especially in STEM courses, as an information literacy approach to connect theoretical concepts with practical applications (L. Bosman & Voglewede, 2019; L. B. Bosman, McDonald, & Paterson, 2019; Camesano, Billiar, Gaudette, Hoy, & Rolle, 2016). *Why online discussions?* STEM educators typically perceive the need to include a large amount of content during the traditional lecture. As such, online discussions (which are completed outside of the class time) can be viewed as low-hanging fruit which can optimize the relationship between educator effort, lecture time availability, and student learning (L. Bosman & Fernhaber, 2019; L. Bosman, Roy, McDonald, & Ababei, 2020; Santiago & Guo, 2018). Information Literacy (IL) is an essential concept in higher education which is commonly used across the globe, IL Skills allow students to gather, evaluate critically, and use information effectively and effectively participate in the information society and digital world such as online learning (Walton & Hepworth, 2011). *How is intercultural communication competence integrated?* Using entrepreneurially-minded online discussions, intercultural communication competence is integrated into an aviation technology course module via videos, discussion prompts, and in-class debriefs. The guiding research questions are as follows:

- How can entrepreneurially-minded online discussions, implemented with a focus on intercultural communication competence, improve student learning and satisfaction?

- What themes or patterns can be discovered in entrepreneurially-minded online discussions, implemented with a focus on intercultural communication competence?

2. Background

The background provides a literature review on intercultural communication competence, entrepreneurially minded learning, and the role of information literacy in solving real-world problems.

2.1 Intercultural Communication Competence

In the modern interconnected, globalized world, intercultural communication competence (ICC) is an imperative skill to develop in the 21st-century student. ICC is defined by Deardoff (2006) as the "ability to behave and communicate appropriately and effectively in intercultural situations based on one's knowledge, skills, and attitudes" (p.247). Teaching students how to understand and participate in a different cultural context is gaining more and more importance in higher education (Hoefnagels & Schoenmakers, 2018). Yet, typical STEM higher education curriculum prioritizes the "hard skills", resulting in graduates entering the workforce with required technical expertise but inadequate "soft skills" such as ICC. As such, employers report that today's college graduates are deficient in intercultural communication competence (British Council, 2013; Hart Research Associates, 2015). Setting ICC aside and focusing on communication skills generally, a report published by the American Management Association (AMA, 2012) surveyed 2000 managers, 25% of whom thought four-year college graduates lacked essential communication skills. According to Wilkins et al. (2015), this gap occurs because STEM faculty tend to prioritize technical skills over soft skills, not seeing the value in how soft-skills training would improve student outcomes.

For students enrolled in STEM programs, mastering technical expertise is just as important as acquiring professional skills, such as leadership, communication, resilience, teamwork, and decision-making (Mendonca, Keller, & Dillman, 2019). These skills help promote scientific leadership, economic competitiveness, national safety, and security. As such, the importance of 21st-century skills, which includes ICC, is continuing to expand (Deardoff, 2015) and is critically important for aviation technology students as employers offer more globalized jobs where ICC is imperative. However, including intercultural competency in the curriculum remains a challenge. According to Brockington and Wiedenhoef (2009), intercultural competency education needs to incorporate authentic learning through real-world experiences. In this process, students achieve concrete learning, reflect on their experiences, and build new understandings and mindsets. These new understandings can help students think deeper about their intercultural interactions and help them to be more aware of themselves and others

(Mezirow, 2000). One pedagogical approach to promote intercultural competency development is entrepreneurially mindset learning. This approach emphasizes developing a mindset that allows the students to identify and solve problems (L. Bosman & Fernhaber, 2018).

2.2 Entrepreneurially-Minded Learning

The entrepreneurial mindset can be defined as a personal characteristic associated with opportunity identification, evaluation, and exploitation (L. Bosman & Fernhaber, 2018). Developing an entrepreneurial mindset is necessary for students to deal with uncertainty, handle novel situations, collaborate, persevere in failure situations, and connect people and ideas to create new understanding (Nadelson et al., 2018). As such, developing the entrepreneurial mindset is important for all students, regardless of whether they pursue a startup or work within an organization. Integrating the entrepreneurial mindset into curriculum allows students to develop crucial skills like collaboration and communication. Collaboration provides students with the opportunity to engage in discussion and debate and participate in a more profound learning experience. Moreover, engaging in collaboration groups will allow students to share and understand the other group members' different perspectives and motivations (L. Bosman & Fernhaber, 2018). Likewise, communication helps students exchange information in the learning environment, allowing them to share and enhance their perspectives.

One way to incorporate the entrepreneurial mindset into learning environments is through discussion prompts in online discussions. Participating in online discussions allows students to interact with each other, develop argumentative skills and communication skills, collaborate, and reflect (Ellis, Goodyear, Calvo, & Prosser, 2008; Herrington, Reeves, & Oliver, 2014), all of which are characteristics of authentic activities. Moreover, another benefit of asynchronous online discussions is that students have enough time to provide stimulating responses and explore different educational and research resources to support their answers. Additionally, students gain insight from other's participation and build shared understanding (L. Bosman & Fernhaber, 2019). Furthermore, the use of discussion prompts in the coursework offers educators a possibility to integrate entrepreneurial mindset learning (L. Bosman & Fernhaber, 2019), offering students multiple ways to accomplish course learning outcomes by assessing how much students are applying the new knowledge. Also, online discussions give educators the chance to provide immediate feedback and ask further questions to dig deeper into the topic (Gallien & Oomen-Early, 2008).

2.3 Online Discussions and Information Literacy

Online discussion has been in existence for a long time, and it became more prevalent as a result of the pandemic caused by COVID-19; most of the teaching

and learning processes are switched to take place entirely remotely by higher education institutions, online discussion allows students to take part and contribute to classroom discussions online, according to Kumar, Cheng, Leskovec, and Subrahmanian (2017), online discussion is said to allow a community, group of people or users to interact and share information and opinions on a wide variety of topics. Additionally, according to Gao, Zhang, and Franklin (2013), online discussion is an important platform that supports learning and helps to facilitate and enhance the teaching and learning process, most notably during the current pandemic where most instructional delivery takes place remotely.

There are various benefits of online discussion in the teaching and learning process, Cheng, Paré, Collimore, and Joordens (2011) asserted that the implementation of online discussion in students' courses helps improve performance in the class. The study investigated the impact of online discussion on students' performance; the online discussion was introduced into undergraduate students' psychology courses. Students were required to participate in online discussions in the course, contributing to the overall course grade. At the end of the study, the authors identified that online discussion facilitates students learning, which positively affects their performance, reflecting on the students' grades in the course. In addition, online discussion positively impacts students' learning, particularly students' overall achievement in class (Alzahrani, 2017). In the study that was carried out in one academic semester at leading universities in Saudi Arabia, the sample used was 138 undergraduate students. The author's finding indicated that online discussion enhances students' achievement. To successfully take part in online discussions, students must have IL skills.

Information literacy (IL) refers to a vital information practice in a society characterized by unlimited access to information; it also encourages information practices in digital environments to shape and constitute essential aspects of people's lives across the globe. Additionally, Information Literacy is the set of skills, attributes, and behavior that is important to students learning in this digital age Secker and Coonan (2011); Information Literacy has been linked explicitly to graduate employability in the UK and other countries worldwide; therefore, it is vital for universities to incorporate IL into students learning to ensure graduates acquire the IL skillsets and competencies during their course of study. According to Gross and Latham (2012), IL skills include research, critical thinking, computer technology, and communication skills. In addition, information literacy involves recognizing when information is needed and efficiently locating, accurately evaluating, effectively using, and communicating information in various formats (Wert, Purzer, Fosmire, & Cardella, 2013).

3. Methods

3.1 Participants

The participants include residential graduate-level aviation technology students enrolled in a three-credit course on team operations at a research-intensive university in the Midwest United States. The students were required to participate in the research as part of a class assignment. Therefore, the IRB protocol was approved as Exempt Level 1 (education research). A total of twenty students participated in the study including four females and sixteen males. The ages of students ranged from 18-25. Thirteen students were U.S. citizens and seven students were international.

3.2 Study Design

This study deployed a mixed-methods approach. First, students participated in five online discussions that focused on enhancing information literacy (prompts are provided in section 3.3). The online discussions required students to watch a video or read an article, and then respond to a series of questions. Second, at the end of the semester, upon completion of the five online discussions, students responded to a survey (also provided in section 3.3). The survey asked students about their perceptions related to participating in information literacy learning activities.

3.3 Data Collection and Data Analysis

3.3.1 Qualitative Data Collection and Data Analysis

Five entrepreneurially-minded online discussion sessions were used to understand how the integration of intercultural communication competence, with a particular focus on crew resource management, could improve student learning outcomes. Each online discussion session included two learning objectives, one focused on the entrepreneurial mindset (EM) and one focused on intercultural communication competence (ICC). In addition, each online discussion session included a hook, initial prompt, and response prompt. Details of the online discussions can be found in Appendix A.

The qualitative thematic analysis was used to analyze the online discussion posts with NVivo 12. According to Braun and Clark (2006), a thematic analysis is a foundational qualitative method for discovering patterns within the data. It should be conducted using a step-by-step process. Two of the authors took the lead on the thematic analysis. These two researchers first become thoroughly familiar with the data to generate initial codes. This information was then shared with a third author for feedback. Together, three of the authors reviewed and analyzed the documents several times. Upon the completion of coding, themes were generated. As a final step, the lead author revised the themes and wrote the report. Due to the qualitative nature of the research, the goal of the analysis was to explore potential themes

within the data. The researchers debated the strengths and weaknesses between strictly conceptualizing themes without quotes and heavily using quotes to provide readers with evidence. It was decided to merge the two philosophies and meet in the middle. Quotes were drawn from the data to allow readers to make their own judgments on credibility, accuracy, and fairness (Corden & Sainsbury, 2006).

3.3.2 Quantitative Data Collection and Data Analysis

Information literacy skills involve the ability to obtain and utilize information correctly. Participants responded to a ten-item survey (Table 2) which included the prompt: “To what extent do you agree that participating in the article critiques and online discussions met the following characteristics?” The survey was based on a 1 – 6 rating scale with the following descriptions: 1 – Strongly Disagree; 2 – Disagree; 3 – Slightly Disagree; 4 – Slightly Agree; 5 – Agree; and 6 – Strongly Agree. The quantitative survey responses were analyzed using SPSS version 26.

Table 1: Information Literacy Survey Findings

Survey Items
1. The article critiques and online discussions had real-world relevance.
2. The article critiques and online discussions require students to define the tasks and sub-tasks needed to complete the activity.
3. The article critiques and online discussions were comprised of topics to be investigated by students over the semester.
4. The article critiques and online discussions provided the opportunity for students to examine topics from different perspectives, using a variety of resources.
5. The article critiques and online discussions provided the opportunity to collaborate.
6. The article critiques and online discussions provided the opportunity to reflect.
7. The article critiques and online discussions can be integrated and applied across different subject areas and life experiences.
8. The article critiques and online discussions were seamlessly integrated with assessment (instructions were clearly stated).
9. The article critiques and online discussions are valuable tools that can be used in various settings (e.g., other classes, other projects, training, etc...).
10. The article critiques and online discussions allowed for a wide range of discussion prompts and a diversity of responses.

4. Results

4.1 Qualitative Analysis - Online Discussion Themes

The researchers conducted a qualitative analysis to understand key themes existing within the online discussions. Three core themes were identified: (1) purpose of multicultural communication, (2) multicultural communication stakeholders, and (3) and multicultural communication barriers.

4.1.1 Purpose of Multicultural Communication

The first theme revolved around the purpose of multicultural communication. Sub-themes were identified including (1) to ensure safety, (2) for training and professional development, and (3) to build trust and engage in relationships.

To Ensure Safety

Aviation safety is the number one priority for any airline in all aspects of air transportation. Poor safety management in aviation not only results in damages associated with a single airplane crash but also includes the loss of much valuable human life. Communicating safety standards and protocol within the network of aviation professionals creates awareness and ensures safe operations. Example quotes are as follow:

- “My confidence is high when it comes to talking or correcting a friend with regards to hazardous aviation operations. If something **feels hazardous** to me, I would want to bring its attention to all involved to **limit any risks** associated with it.”
- “I am very confident pointing out **safety hazards** to friends, as if something happened and I did not speak up, I think I would almost blame the accident on myself.”
- “I feel confident voicing my concerns that can affect the safety of the operations. I believe that being safe **should be a priority.**”
- “Only when people have the willingness to **talk hazards**, they realize some **potential hazards** may around us. Like we discussed is the class, everybody are responsible for safety of [University], when some people find some **potential hazards**, the first thing they need to do is reporting them to the corresponding person.”
- “I am very confident in talking with my friend and correcting them **during a hazardous** aviation operation. For example, if my friend unfastens her seat belt while the airplane is taxing on the runway, I will immediately point out her mistake and correct it.”

- “I am confident to talk with or correct my friend **during a hazardous aviation** operation. I know that if I don’t do anything, I might be the victim as well. As a matter fact, when I see anything unsafe to happen, I am willing to call out thanks to my aviation safety education and training throughout the years.”
- “I definitely agree with this notion that **reporting safety issues** should be accessible to everyone. It surprised me to learn that the management and AET students did not know how to report **safety issues**, let alone what to look for. I think that's the problem, I think sometimes we assume that other groups have the same knowledge as us or look at things the same way when in reality that is not the case. We need to share our knowledge amongst groups in order to make the Lafayette Airport safer and to strengthen the learning environment here.”

For Training and Professional Development

Training is key to ensure every aviation professional is up to date with the current protocols and standards followed across the industry.

- “Knowing some medical knowledge is necessary for cabin crew members because some passengers have some physical diseases. CBT **training program** could add this item.”
- “These are the expectations that I like to see with a flight attendant. I also agree with you that flight attendants are already well trained, and I believe **extra training** should be used toward flight attendants that are not meeting standards.”
- “**Competency based training** can improve flight attendant performance if the flight attendants do not meet the standards.”
- “I agree with your thoughts about CBT, if a flight attendant is not meeting current company standards, then **CBT can be a effective method** to ensure those standards are met.”
- “I think CBT could improve flight attendant training because it will help to focus the training in on the specific competencies. It will also help to ensure that all of the flight attendant trainees are on the same page **during training** and know exactly what they are expected to learn and what they are being evaluated on.”
- “**Competency based training** allows for a greater focus on individual components of a task which I believe would be helpful as mastery is ensured before moving forward. It may help flight attendants be more prepared to deal with emerging FA problems such as dealing with unruly passengers.”
- “CBT is a great tool to create professional crew members who can **deliver**

- **on their training** instead of just passing a checkride.”
- “CBT could be useful for flight attendants who might struggle to meet their expected **standards**. Once a flight attendant has met or exceeded that standard, I think that CBT could be useful to maintain currency and familiarity with **emergency protocols**.”
- “I personally feel that CBT could improve flight attendant performance as long as they don't get carried away with it. Their focus should always remain the same i.e. ensure passengers safety. As long as this purpose is being served, **any form of training** can be supported.”
- “CBT training could help with the basics of the job, but I think being a flight attendant is such a customer service-based job that there should be more **hands-on training**.”

To Build Trust and Engage in Relationships

The aviation industry is a global network that consists of individuals with diverse backgrounds and cultures. To ensure a safe work environment, each and every individual is required to work collectively by effectively communicating the goals of the industry through various communication channels. Establishing a healthy working relationship ensures harmony and agreement amongst all stakeholders and the customers.

- “Personally, I'm comfortable correcting a friend on an un-safe action. A lot of this comes down to power distance as they're my friend and we have **a close relationship**. However, I might be less inclined to speak with a stranger if I observe an unsafe act just because I don't know them.”
- “I will be confident in correcting my friend during a hazardous aviation operation due to a low power index that exists because of the nature of **our relationship**.”
- “I think that the **flight attendants' approach** to safety in the video is different since it still hits the major points that they are required to say to the passengers but has some entertainment value for the passengers to listen to. One of the problems with this is by making it more entertaining it can lead to passengers **paying more attention** to the jokes or remembering the jokes instead of the actual safety content.”
- “I totally agree with your idea about the flight attendants' approach in that video. Adding some entertainment value for the passengers to listen to is a good way to help **them pay attention to the safety demonstration**.”
- “I believe that there's a trade off when incorporating humor within the **safety briefing**. The **humorous safety briefing** gets more attention from the passengers than a regular one; however, they might be more subject to

ignoring the actual briefing and **listening** more to the joke. I do agree with you that it can be **distracting**; however, I think it is better to have the **passengers pay attention** than not pay any attention at all.”

- “I totally agree that it may make certain individuals forget the content and remember the joke instead, but I think that this may be helpful because it might make the flight attendants **more approachable** and get passengers to ask questions if they're unsure. It adds **another level of friendliness**.”
- “So far, I think the flight attendants could show the passengers how they would be **assisted** during the emergency situation. I have a good flight attendant experience with China Southern Airlines flight attendants. I flew a domestic flight from Guangzhou to Beijing in the first class of A320. It was a red-eye flight, the flight attendants covered me with a quilt when I was sleeping during the flight. I felt that the flight attendant was so **friendly and kindly**. I believe that most flight attendants are already well trained for most emergency situations.”
- “Based off of your personal experience with China Southern Airlines, it shows that most people would like to have a flight attendant that is **kind, approachable, and wants to keep the customers happy**. These are the expectations that I like to see with a flight attendant.”
- “I would hope that flying in first class they **treated you nicely** since that is where a large majority of the business travelers fly and they often are more willing to switch since the company pays for their ticket instead of them.”
- “I think it was a **nice gesture** by the cabin crew to provide you with a quilt during your red-eye flight. This is just one way that flight attendants go above and beyond the normal expectations of their jobs. I think it also helps out the image of the airline. Passengers **interact** with flight attendants on almost every flight and having a negative encounter with one could lead to having a negative view of the airline. If the flight attendants have **good interactions** with the passengers, the passengers will have good views on the flight, and possibly influence the decision of what airline they choose on future flights.”
- “I like flight attendants that are **very approachable**. In emergency situations, it would be ideal to have flight attendants that help the passengers remain calm to the best of their ability.”
- “The safety briefing is important because it **communicates** essential information that needs to be understood by all in the event of an emergency. As demonstrated by the successful evacuation during AWE1549, both the crewmembers and the passengers need to be **informed** of the proper procedures and conduct for the situation. The use of **humor** can be very beneficial as a hook but should not detract from the transmission of information.”

- “I agree with your statement **about liking** flight attendants that are **more approachable** than others. It's always nice to walk on to a flight and have a smiling, happy crew on board to **greet you** and make a stressful commute or long flight more enjoyable.”
- “I think what makes a good flight attendant experience is that the flight attendant is **personal, professional, and empathic to the passengers**. CBT could be a method to ensure that a flight attendant is meeting company standards, but if the standard is being met, I do not see additional training needed”
- “The **relationship** between the captain and the co-pilot is a very important one and has an inherent authority ranking to it. CRM training, I think could help this divide, as it would teach these two people on opposite sides of the authority spectrum how to work together effectively and provide the safest flight possible.”

4.1.2 Multicultural Communication Stakeholders

The second theme was associated with the multicultural communication stakeholders. Sub-themes were identified including (1) non-crew stakeholders (e.g., controllers, passengers, front-end workers) and (2) crew stakeholders (e.g., pilots, flight attendants).

Non-Crew Stakeholders

A constant line of communication amongst the non-crew members of the industry (i.e., the controllers, passengers and front-end staff) ensures a safe operating environment.

- “**Communication** scored the highest score in the testing conducted of the ground workers taken in this study. **Communication** seemed to be vital between management and the ground crew for success.”
- “I agree that **communication** is important for safety culture to be effective. **Communication** is also important in every part of aviation, between managers, dispatchers, pilots, etc.”
- “To me one of the most important areas of positive safety culture is **communication**. Employees working on the front line have to have a way of **communicating** with safety personnel to make hazards known. Additionally, the company needs to be able to **communicate** procedures for emergency situations to all of its employees.”
- “To improve safety here at Purdue Aviation we should continue **positive communication** with all parties involved with airport operations. **Internal communication** within the department is great but bringing in outside

bodies that share our facilities like ARF, ATC, Purdue Aviation LLC, Airport Ops, etc. would allow for **greater communication**. This could go a long way to create **positive communicating** between these organizations to further grow our safety culture.”

- “There is definitely **miscommunication** between [University] Aviation and [University] in the flight department. This is crucial since [University] Aviation teaches Purdue University students in the Cessna 172s. Corrective action would be to **enhance communication** between the two.”
- “**Communication** is the most important factor in all aviation operations. If aviation workers (pilots, ground crew, etc.) are **not communicating** with one another, safety and efficiency is lost. Aviation is a team effort, and in order to do so, workers must **communicate** with one another.”
- “I agree that manager and front-line **workers communicating** efficiently is essential to smooth safety operations. Managers can impart top-down knowledge and standards while front-line workers are the ones who see what is actually happening every day.”
- “I think that **communication** is the most important to a positive and strong safety culture. It is crucial that **good communication** exists between those on the ground and management to ensure that safety concerns are dealt with quickly and properly.”

Crew Stakeholders

The crew on board i.e. the pilots and cabin crew work collectively to ensure that the passenger receives the best experience on board and safe passage to the destination.

- “Improving CRM through **balancing cultural dimensions** in the cockpit will become more important as aviation progresses. As mentioned with Qantas, Qatar, and Emirates they are **hiring pilots** from every corner of the globe, with this they need to be able to have pilots from **different cultures interact** with each other. As this continues having pilots understanding of different cultures and how they interact with each other.”
- “I feel that if a stronger emphasis is put on the CRM and procedural training aspect this may alleviate some of the importance of the former training, as **all pilots will be able to interact** and know what to expect.”
- “The best way to improve crew resource management is to provide training in the airlines that emphasizes cultural dimensions and potential hazards that come with them. It is important to **inform pilots** that maintaining a balance within all cultural dimensions leads to advanced safety and more efficient crew resource management. As mentioned before, the airlines

should provide cultural dimensions training within the **indoctrination into the company**. It is important to have the pilots become aware of potential imbalance of cultural dimensions within the cockpit.”

- “I believe that providing training that **educates** about the hazards associated with each cultural dimension and how to **adapt** to working with different crew members will be the best way to improve crew resource management. I think that having CRM **education** at the university level helps future pilots learn about its importance and help overcome the cultural dimensions impacts. I think that education and awareness is an important method to reduce the harmful impacts it may cause.”
- “Crew resource management is the next big step in trying to **improve cockpit relations**. Improving CRM will lead to crews working together instead of one person calling the shots.”
- “The **relationship between the captain and the co-pilot** is a very important one, and has an inherent authority ranking to it. CRM training I think could help this divide, as it would teach these two people on opposite sides of the authority spectrum how to **work together** effectively and provide the safest flight possible. The first step to tackling these cultural differences is acknowledgment. Our pilots need to be aware of these differences and the good and bad of them before they can recognize and adjust their own behavior.”
- “I think that as step taken in the aviation industry to combat these negative impacts of power distance in the **cockpit is training students/pilots** in a CRM environment before getting to an actual airline. For example, Purdue offers a Phenom and CRJ simulator course where the basic fundamentals of CRM can be learned and applied to the next-level setting. Ultimately making these transitions more seamless and safer for all on board.”
- “There needs to be **culture-specific training for crews** that pertain to the nationality of the airline but also just culture in general. US airlines tend to hire only domestic pilots, but culture could mean a lot more than just nationalities. Future CRM training should incorporate both national and company culture training.”
- “**Individualism** also can have a strong impact in aviation safety. The whole flight attendants are a team, they all have the responsibility for passenger's safety. They cannot **work individually**, because cooperation is the most important concept among flight attendants.”

4.1.3 Multicultural Communication Barriers

The final theme was connected to multicultural communication barriers. Sub-themes were identified including (1) power distance, (2) non-standard phraseology and accents, and (3) non-verbal communication.

Power Distance

To minimize the consequences of unsafe flight operations, communication amongst the flight crew is vital. Power distance exists due to ineffective training standards across cultures and can result in human error caused aviation accidents.

- “I think there is another reason caused this accident, it is **power distance**, if the first officer can question the first officer, the accident may not happen. I strongly suggest that ICAO can cooperate with airlines to select pilots, which can guarantee that a qualified pilot (without accent) can be picked. As for the **power distance**, different countries have different **power distance**, so it is very hard to change that immediately, but airline can encourage some low status employees to change the people who have high status (like first officer and pilot).”
- “I believe that **power distance** was one of the largest contributors to this accident. It is hard in any profession to question your superior. However, those who are above us still can make mistakes too, which something that everyone should keep in mind. It appears that aviation is steering away from **large power distance** in most cultures.”
- “I find your thoughts on the importance of **power-distance** in flight decks to be quite compelling. It is clear that such behavior, though a possible representation of the national culture, can lead to hazardous situations developing. With the spread of Crew Resource Management, a clear emphasis has been put on reducing the **inhibitions of power-distance**, specifically when the safety of the flight may be put into question.”
- “The next cultural aspect that affected the accident was the **power distance** that existed between the KLM pilots. The captain had high seniority in the company and it ultimately prevented the FO from speaking out his concerns. If there were **less of a power distance**, the FO could have taken a more urgent approach to voice his concern.”
- “Totally agree with your idea that **power distance** is the most influential one affect aviation safety. I like your example as well, the captain and first officer. At most countries, especially in these countries which have **high power distance**, first office cannot question captain, which is bad for aviation industry. Nobody is absolute right, when our ideas are opposite to others, we need to tell them or question them, which is good for our development.”
- “I think the Hofstede cultural dimension that has the most affect on safety in the aviation environment is **power distance**. The reason for this is that with the Tenerife crash this was one of the situations where the first officer did not want to correct the captain about the take-off call from tower. In

addition the Asiana airlines was also related through the not correcting elders about situations in the cockpit.”

- “I agree with your idea about the significant influence of **power distance** culture dimension in the aviation safety area. **Power distance** always exists in the aviation industry. The captain usually is the pilot in command on board. If an emergency happens, the captain should be the one has the highest authority. But airlines should educate their pilots to put safety as their priority, and encourage the FO to see something then say something.”
- “I think the cultural dimension that has the greatest effect on safety in an aviation environment is **power distance**. In a **low power distance** setting, it is not uncommon for subordinates to make their voices heard. They are less likely to be afraid of speaking up when they see something done in an unsafe manner. I think this is key to aviation safety. Subordinates need to be respectful of the leadership that is in place over them, but I don't think that they should ever be discouraged from holding their superiors accountable or questioning procedures that are in place.”
- “In my opinion, **power distance** is the most influential one affect aviation safety among Hofstede's six cultural dimension. Nobody is absolute right, so anybody can make a mistake. The way that can correct people's mistake is tell them. However, the existence of **power distance** prevent that. Like Jixiang Airline, the employee did not question his boss' decision to start another air route which caused 20 million loss. I think airlines should empower first officers to question captain, they also need to propose that everyone are equal”
- “**Power distance** is certainly a major problem in many cultures where individuals are afraid to speak up and go against their superiors. I agree that empowering FO's would be a great idea, but I also know that there are many older captains who would be angry with a young and naive first officer. This might create another set of problems that the industry is not ready for.”

Non-Standard Phraseology and Accents

Aviation is a diverse industry i.e. consists of professionals from different backgrounds and cultures. Accidents/incidents that occur from non-compliance with aviation phraseology and language barriers are not uncommon. To minimize such errors, the flight crew and ground support staff need to ensure that communication via any channel conforms to the standard phraseology.

- “I believe that the Tenerife accident was plagued with communication problems due to different cultures. The largest problems would be due to the **different accents** (English, Spanish, and Dutch) **and phraseology** used

- by those involved (KLM, Pan Am, and the controllers).”
- “I think you brought up a great point in identifying the **different accents and nonstandard phraseology** that led to a bigger problem in this accident. I think this accident raises great concern in that specific area.”
 - “I like your idea that accident **and informal phraseology** between pilots and ATC caused the Tenerife Crash. Indeed, communication is very important in our life, especially for aviation industry, just one mistake may cause hundreds of people die and many money loss.”
 - “I think that the communication between ATC and the aircrafts were affected by the **different cultures, and the use of nonstandard phraseology**. Having different cultural backgrounds can create communication barriers with the different accents and may cause confusion between them”
 - “The major one was the communication problem due to the **language barriers** among different cultures. Though, the three main groups of people in this accident, KLM pilots, Pan Am pilots, and the aircraft controllers, spoke English to communicate. Some of them have **different accents** as English was not their native language. Inaccuracy and misleading words used in that conversation may easily confuse the other parties.”
 - “I think the possible reason that caused this tragedy was the different communicating culture of ATC. Firstly, even if English is the common official communication language in the global aviation industry, but there is a big difference of English speaking style and **accents** for the people whose **native language** is not English.”
 - “I think communication is also one of the biggest issues that cause the tragedy. The captain misunderstood what ATC requested, which was a fatal to the safety operation. It is very crucial for ICAO to build up a common **communication standard** for ATC communication in the world.”
 - “I totally agree that good communication is vital for safe aviation conditions. The example you gave of good communication during flight training is an excellent correlation between how **proper communication** can avoid aviation accidents.”
 - “One of the first cultural aspects was **the difference in native language**. While the Pan American pilots natively spoke English, the tower spoke Spanish and the KLM crew spoke Dutch. This caused great issues in understanding each other even though many of the radio calls were walked on.”
 - “**Communication can be tough over the radios** especially in aviation where there can be multiple aircraft at once and you may be unsure of what said from tower.”

Non-Verbal Communication

Positive attitudes and behavior towards safety protocols is a responsibility of every member in the aviation industry. Safety reporting across all stakeholders is vital to promote safety culture across all levels of management.

- “I think **attitudes towards safety** is a very important aspect of safety culture. When everyone working together is invested and genuinely cares about the safety of themselves and the others around them, everything seems to just work better.”
- “I agree that **attitudes** have a big role in safety culture. Just like anything else, if you have a **negative attitude** about something, it will not go over as well as it could have.”
- “I agree that **attitudes towards safety** is a pretty important part of safety culture. Everyone has to be onboard in order for the system to work properly.”
- “Growing up we all must have heard of the phrase 'Safety begins at home', I believe that it is important to **propagate aviation safety** culture amongst the students of School of Aviation and Transportation Technology given that we have an airport on campus.”
- “I am totally agreeing with you that **attitude plays a big role in safety culture**. Attitude decides everything in your life. For Purdue safety culture build up, help everyone in this community establish their awareness of safety culture is a good way to improve the safety at Purdue.”
- “In too many scenarios, the personnel involved in unsafe operations may be affected by one of the **five hazardous attitudes**. Such **poor attitudes** towards safety can easily lead into the degeneration of a strong safety culture. As such, it is of key importance to emphasize the benefits of a strong safety culture to the widest contingent possible. A strong culture of safety can be attributed in part to strong **positive feelings** towards it, which allow its members to feel valued and appreciated for their input.”
- “I agree that the **attitude** of each member have an effect on the safety culture of the organization. Having all levels of the organization also makes a difference on how safety reporting is **perceived** in the organization.”
- “I think **that attitudes towards safety culture** is most important because if everyone around the organization is not taking safety seriously, especially upper management, then most people will follow suit and not take safety seriously either.”
- “I think that **attitudes towards safety** is very important for a good safety culture in an organization. I agree that we need to give potential safety hazards more visibility so everyone can be on the lookout for any potential

issues.”

- “I think **attitudes about the safety culture** are the most important, although all 9 pieces are needed to be truly efficient. Without positive attitudes, without belief in the system, everything can begin to break down. **Apathy** is the enemy of safety and the reason corners start being cut.”

4.2 Quantitative Analysis – Information Literacy

The researchers conducted a quantitative analysis to evaluate student perceptions of information literacy learning embeddedness.

4.2.1 Survey Findings

Information literacy skills involve the ability to obtain and utilize information correctly. Participants responded to a ten-item survey (Table 2) which included the prompt: “To what extent do you agree that participating in the article critiques and online discussions met the following characteristics?” The survey was based on a 1 – 6 rating scale with the following descriptions: 1 – Strongly Disagree; 2 – Disagree; 3 – Slightly Disagree; 4 – Slightly Agree; 5 – Agree; and 6 – Strongly Agree. On average, the participants agreed (slightly, generally, or strongly) the online discussion assignments promoted information literacy. The highest items were #5 and #6, which respectively relate to collaboration and reflection. The researchers found this to be optimistic since those are two core components of entrepreneurially-minded learning (as previously shared in the background section). The lowest items were #2 and #9, which respectively relate to breaking down into tasks and transferability to other learning environments. This is not surprising, and adds to the validity of the findings, given that the online discussion assignments were straight-forward and modularized (required limited breakdown of task) and the prompts were context-specific (which often prevents students from connecting the concepts to other coursework).

Table 2: Information Literacy Survey Findings

Survey Items	N	Min	Max	Mean	Std. Dev.
1. The article critiques and online discussions had real-world relevance.	18	4	6	4.83	0.707
2. The article critiques and online discussions require students to define the tasks and sub-tasks needed to complete the activity.	18	3	6	4.61	0.778
3. The article critiques and online discussions were comprised of topics	18	3	6	5.00	0.840

to be investigated by students over the semester.					
4. The article critiques and online discussions provided the opportunity for students to examine topics from different perspectives, using a variety of resources.	18	3	6	4.67	0.907
5. The article critiques and online discussions provided the opportunity to collaborate.	18	3	6	5.06	0.938
6. The article critiques and online discussions provided the opportunity to reflect.	18	3	6	5.06	0.873
7. The article critiques and online discussions can be integrated and applied across different subject areas and life experiences.	18	3	6	4.78	0.878
8. The article critiques and online discussions were seamlessly integrated with assessment (instructions were clearly stated).	18	2	6	4.67	1.188
9. The article critiques and online discussions are valuable tools that can be used in various settings (e.g., other classes, other projects, training, etc...).	18	3	6	4.61	1.037
10. The article critiques and online discussions allowed for a wide range of discussion prompts and a diversity of responses.	18	3	6	5.00	1.085

4.3 Summary and Discussion

In response to the research question, *What themes or patterns can be discovered in entrepreneurially-minded online discussions, implemented with a focus on intercultural communication competence?*, Figure 1 provides an overview of the themes which compares aviation intercultural communication to the traditional communication process. The core themes or patterns identified include a focus on communication stakeholders, communication purpose, and communication barriers. The themes identified within the responses from the discussion prompts align well with the traditional communication process. This supports the definition of intercultural communication defined by Deardoff (2006) which is the "ability to behave and communicate appropriately and effectively in

intercultural situations based on one's knowledge, skills, and attitudes" (p.247). In other words, the communication process is the same, yet the context (aviation and intercultural aspects) is specific to intercultural situations. The alignment between the aviation intercultural communication and traditional communication process implies the learning objectives were achieved at the group level (given the focus on themes and patterns).

In response to the research question, *How can entrepreneurially-minded online discussions, implemented with a focus on intercultural communication competence, improve student learning and satisfaction?* participants perceived collaboration and reflection to have the highest level of agreement. The perception of collaboration is consistent with other studies in the literature. Putman and Tancock (2012) conducted a study on online discussions which evaluated two key components of an effective online discussion: participant collaboration and cognitive engagement. The study resulted in a taxonomy including seven combinations of behaviors and attitudes demonstrating various levels of collaboration and engagement which will result in the greatest likelihood of effectiveness. In addition, the perception of reflection is also consistent with the literature. Snyder (2019) provides a meta-review documenting a holistic summary of the literature which provides the theoretical underpinnings of reflection, benefits of reflection, and an overview of its most effective applications in the classroom. On the other hand, the lowest rated items were related to breaking down into tasks and transferability to other learning environments. Although this is not surprising, efforts will be made in future teaching interactions to focus more on improving metacognition skills to break down tasks to complement time management and scheduling (Terrace & Son, 2009). Also, efforts will be made to integrate mind mapping skills to incite prior knowledge and promote transferability to other learning environments (Dochy & Alexander, 1995).

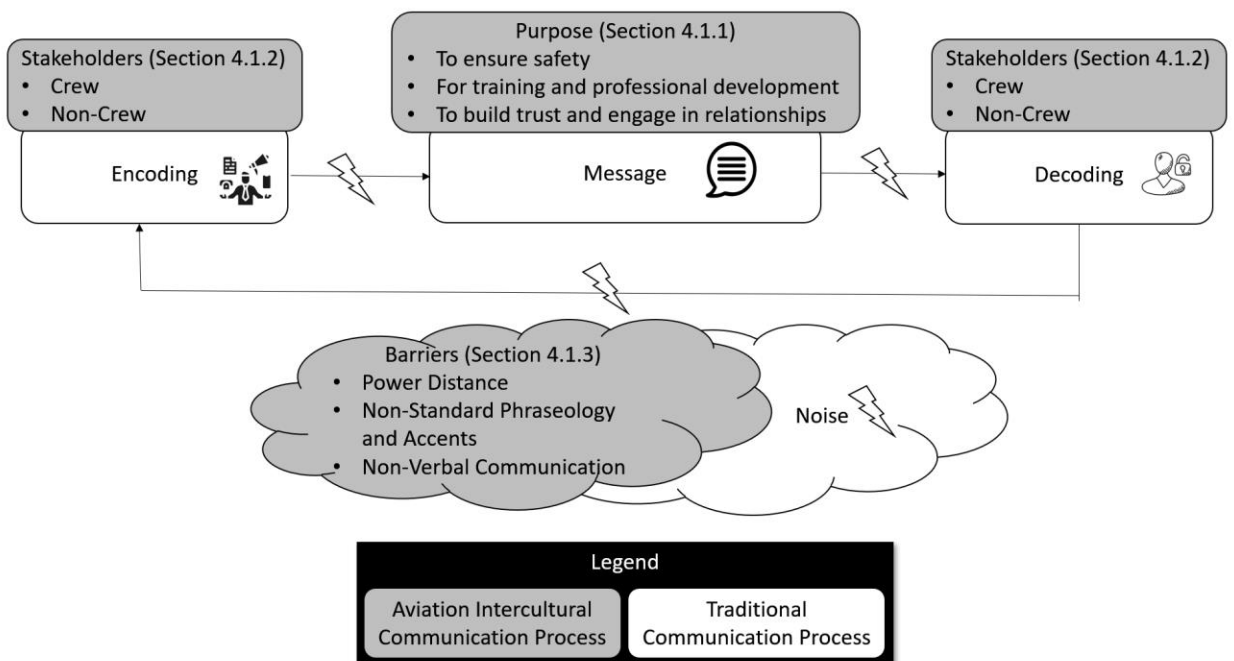


Figure 1. Overview of Themes (Comparing Aviation Intercultural Communication to Traditional Communication Process)

5. Conclusions

5.1 Practical Implications

The continued rise of the global economy has required governments, organizations, and higher education institutions to think more strategically about skill development around diversity, equity, and inclusion (DEI) and intercultural competency efforts (Irving, 2010). Additionally, online discussion and information literacy became more vital in education during this period; this study was conducted during the COVID-19 pandemic in which higher educational institutions switched to online learning. One of the approaches to which learners can acquire information literacy skills is through online discussions. However, a survey of educators suggests that a major challenge with integrating intercultural competence in STEM higher education is due to knowledge gaps and limited experience around instructional design (López-Rocha, 2021). There are several approaches which have been used within higher education institutions to increase student professional skill development in intercultural competence. Yet gaps remain, primarily because of access barriers including the need for extra time, money, and resources. This study contributes to the academic literature by showing one approach for overcoming these challenges whereby faculty can integrate intercultural

communication competence into the STEM classroom via entrepreneurially minded online discussions. The guiding research questions were as follows:

- How can entrepreneurially-minded online discussions, implemented with a focus on intercultural communication competence, improve student learning and satisfaction?
- What themes or patterns can be discovered in entrepreneurially-minded online discussions, implemented with a focus on intercultural communication competence?

In response to the research questions, students' perceptions of information literacy were improved. Moreover, themes or patterns identified within the online discussions align well with the traditional communication process. The alignment between the aviation intercultural communication and traditional communication process implies the learning objectives were achieved at the group level (given the focus on themes and patterns). Implementing online discussions within the STEM classroom can be seen as "low hanging fruit" in that the return on investment for faculty is very high (i.e., requires minimal lecture time and promotes optimal connections to the real world). Moreover, the use of asynchronous online discussion ensures everyone has the opportunity to participate and has their voices heard, while at the same time providing the necessary time for individuals to think critically and holistically about the topic.

5.2 Limitations and Future Research

Three limitations of the study potentially exist due to the small sample size, focus on one classroom, and use of one set of survey questions. However, all three can be overcome with future research. First, the study was limited to twenty students, which is acceptable for a qualitative study but is considered relatively low for a quantitative study. Although a mixed-methods approach was useful in analyzing the data from multiple data sources, future research would benefit from bigger sample sizes. Second, the focus on one graduate-level classroom for aviation technology students enrolled in a three-credit course on team operations at a research-intensive university in the U.S. Midwest offers limited generalizability to other class sizes, STEM disciplines, and regions. Future research would benefit from access to more diverse STEM classrooms in regions throughout the world. Finally, the information literacy survey questions offer room for improvement. Future research should consider the use of modified prompts for deployment and assessment in future studies.

Appendix A

Discussion Session 1: Communication

- EM Learning Objective: Students will be able to empathize (e.g. design thinking) with crew members involved in aviation accidents (which resulted due to communication failures).
- ICC Learning Objective: Students will be able to detect causes of communication failures and cultural aspects of communication problems within aviation accidents.
- Hook: Watch this video (<https://www.youtube.com/watch?v=HuvND-1pwNU>) which provides an interview with the sole surviving pilot of the well-known Tenerife Crash.
- Initial Prompt: What cultural aspects of communication problems happened in the Tenerife Crash? Reflect on a time when communication was crucial to getting a task done. How did it affect you? *Initial post should be at least three sentences.*
- Response Prompt: Respond to at least two peers' posts with the least amount of responses. *Replies and responses should be at least three sentences.*

Discussion Session 2: Safety Culture

- EM Learning Objective: Students will be able to empathize (e.g. design thinking) with the safety motivations of ground operations personnel and management.
- ICC Learning Objective: Students will understand the impact safety culture has on-ground operations and how it differs from managerial beliefs and expectations regarding safety.
- Hook: Watch this video (<https://www.youtube.com/watch?v=9Qqyk4FFI9Y>) which summarizes the Cargolux approach to ground safety.
- Initial Prompt: Which of the nine pieces tested do you think is the most important for developing a positive and strong safety culture? How confident are you with talking with a friend and/or correcting them during a hazardous aviation operation? What do you feel would improve the overall safety culture at [University]? *Initial post should be at least three sentences.*
- Response Prompt: Respond to at least two peers' posts with the least amount of responses. *Replies and responses should be at least three sentences.*

Discussion Session 3: Learning Styles

- EM Learning Objective: Students will be able to ideate (e.g. design thinking) and exploit (e.g., entrepreneurial process) learning approaches best suited for individual learning.

- ICC Learning Objective: Students will be able to assess and understand their learning style.
- Hook: Complete this assessment (<http://www.educationplanner.org/students/self-assessments/learning-styles.shtml>) to better understand your learning style.
- Initial Prompt: *Explain one of the four learning styles. What is your learning style? Now that your learning style has been identified, how will you use it?*
- Response Prompt: Respond to at least two peers' posts with the least amount of responses. *Replies and responses should be at least three sentences.*

Discussion Session 4: Flight Attendants and Competency-Based Training

- EM Learning Objective: Students will be able to define (e.g. design thinking) and assess the customer desirability (e.g., most valuable design) associated with airline safety-related customer service.
- ICC Learning Objective: Students will be able to explain competency-based training and its relationship to passenger satisfaction.
- Hook: Watch this video (<https://www.youtube.com/watch?v=07LFBydGjaM>) which showcases Southwest Airlines's flight attendant reciting the required safety information.
- Initial Prompt: What do you think of the flight attendant's approach to a safety briefing in the video? What are your expectations for your flight attendants? Do you have a flight attendant experience that stands out in your mind whether good or bad? Do you think competency-based training could improve flight attendant performance? Why or why not? *Initial post should be at least three sentences.*
- Response Prompt: Respond to at least two peers' posts with the least amount of responses. *Replies and responses should be at least three sentences.*

Discussion Session 5: Hofstede's Cultural Dimensions

- EM Learning Objective: Students will be able to define (e.g. design thinking) and ideate (e.g., design thinking) multiple aspects of crew resource management.
- ICC Learning Objective: Students will be able to understand how does Hofstede's Cultural Dimensions affect cockpit culture and how to improve the management of aviation safety systems from a cultural aspect.
- Hook: Watch this video (https://www.youtube.com/watch?v=QVaQYhd_Qy0) which shows the cockpit scenario recovered from Asiana Flight 214 Crash at SFO in 2013.

- Initial Prompt: Explain which of Hofstede's Cultural Dimensions you believe is the most influential or has the greatest effect on safety in an aviation environment. What do you think are the steps taken by the aviation industry today to overcome the negative impacts of these cultural dimensions in the cockpit? How can crew resource management be improved to balance these cultural dimensions in the cockpit? *Initial post should be at least three sentences.*
- Response Prompt: Respond to at least two peers' posts with the least amount of responses. *Replies and responses should be at least three sentences.*

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