Intercultural Attitudes and Behaviors as Exhibited by Cybersecurity Students

Dr. Aparajita Jaiswal, Purdue University

Aparajita Jaiswal is an Intercultural Research Specialist with CILMAR, Purdue University. Her research endeavors revolve around exploring strategies for seamlessly integrating intercultural learning into both regular curriculum and study abroad programs. Aparajita actively engages in offering guidance in developing research studies, curriculum enhancements, and assessment methods pertaining to integration and cultivation of intercultural competence. Her expertise extends to facilitating workshops and training sessions, catering to the needs of both staff and students within Purdue University.

Dr. Paul J. Thomas, Purdue University
Owura Kuffuor, Purdue University

Owura Kuffuor is a PhD Candidate in the Educational Studies Department, Purdue University. His research focuses on intercultural learning strategies tailor-made for individuals that take into consideration context, and background of the individuals.

Integrating Intercultural Competence in Cybersecurity Education: Bridging Cultural Gaps in STEM

Abstract

Developing an interculturally competent workforce has become a necessity. This is especially true in STEM disciplines, where students often need to work in diverse environments upon graduation. Studies have demonstrated that STEM students find it challenging to work with a diverse population. This is juxtaposed with the reality that over 50% of STEM employers prefer to hire interculturally competent graduates. As such, national agencies and higher education institutions have been urging STEM faculty to integrate intercultural competence into the curriculum. Through this study, we intend to showcase the integration of intercultural competence concepts in a first-year cybersecurity classroom. The pedagogical framework for the course is project-based learning. The Intercultural Knowledge and Competence (IKC) rubrics proposed by The Association of American Colleges and Universities (AAC&U) were used to integrate the intercultural component into the course. We describe the pedagogical design of the course, training sessions, role of teaching assistants, online modules, and reflection activities that helped students to become cognizant of intercultural competence. The guiding research questions for our study are: i) How do first-year cyber security students self-identify in terms of intercultural competence? ii) What is the nature and strength of the relationships between different dimensions of intercultural competence as measured by the ASKS2 Scale among first-year cybersecurity students? iii) What are the perceptions of students regarding the intercultural concepts that they learned through this course? We used a multi-method research design to answer our research questions. To answer the first research question, we analyzed the quantitative data obtained from the Attitudes, Skills, and Knowledge Short Scale (ASKS2) survey. The ASKS2 was used to assess the intercultural competence beliefs of the students. The survey data was analyzed using descriptive statistics. The results of the analysis showed that students demonstrated a high degree of openness (mean score above 5). For all other behaviors, namely curiosity, communication, empathy, knowledge of worldview, and cultural self-awareness, the mean scores of the students were between 4 and 5 on a 6-point Likert Scale. To answer our second research question we conducted correlation analysis as we wanted to understand the relationship between the six dimensions of the ASKS2 scale. To answer our third research question, we conducted a thematic analysis and the three broad themes that emerged were*: i) learning about other cultures is crucial to bridge communication differences across cultures, ii) learning about other cultures helped to become mindful and care for people who are different from you, iii) learning and reflecting on cultural values and differences has helped me to learn teamwork skills.* The results suggest that students recognized the importance and value of intercultural competence in their interaction with others from diverse backgrounds. In summary, integrating intercultural competence in STEM courses can help students develop cultural awareness as well as strategies to navigate the differences effectively.

Keywords*:* undergraduate students, STEM, intercultural competence

Introduction and Background

In this era of the 21st century, science, technology, engineering, and mathematics (STEM) education has gained paramount significance. Projections indicate that the U.S. economy will witness an addition of approximately 1.4 million STEM-related jobs by the year 2030 [1]. Notably, the median wage for STEM occupations is roughly double that of other professions in the economy. Consequently, higher education institutions advocate for increased enrollment in STEM programs. The increasing globalization of the workforce and the collaborative nature of the STEM fields underscore the critical need for intercultural competence within STEM education. Intercultural competence defined as an ability to communicate effectively and behave appropriately when interacting with someone from a different cultural background [2], has become a pivotal skill for STEM professionals navigating global challenges and innovations [3], [4], [5]. Given the collaborative nature of STEM work, individuals with STEM backgrounds are expected to engage effectively with peers from diverse backgrounds [6]. However, recent studies have revealed that STEM students lack interpersonal and intercultural skills [3]. One of the potential reasons for lacking such skills is the sequential nature of the STEM curriculum, which makes it harder for STEM instructors to incorporate non-technical concepts into their curriculum [5]. Working in multicultural teams and developing intercultural competence is crucial for STEM graduates. Therefore, policymakers and educational practitioners emphasize the need for higher education institutions to foster intercultural skills and knowledge among students actively [7], [8], [9]. Developing intercultural competence allows individuals to cultivate a set of cognitive, affective, and behavioral skills and characteristics that support meaningful and successful interactions in a variety of cultural contexts [10], [11]. Efforts to embed intercultural competence in STEM curricula have shown promising results, including improved student retention and success rates [12]. Such outcomes not only benefit individual learners but also enhance the STEM fields as a whole by fostering a more inclusive and innovative environment. To achieve this goal, higher education institutions have implemented a dual strategy, employing both co-curricular opportunities such as study abroad programs, research experiences, and community engagement, as well as integrating intercultural concepts into the formal curriculum [13]. Study abroad programs are the most common way to help students develop global competence, but a large number of students cannot participate in such programs due to several constraints, such as time commitment, international travel requirements, and lack of financial support [14]. Studies have revealed that incorporating intercultural competence concepts into regular STEM courses will allow a large number of students to develop intercultural knowledge and skills. This acquisition of intercultural learning will help students develop openness, curiosity, and cultural awareness [15], [16]. For example, a recent study was conducted in a junior-level engineering course that incorporated an online module on multicultural teamwork and cross-cultural communication into a systems thinking course. The goal of the module was to help students understand the different communication styles and teamwork strategies and how they vary across cultures. Upon completion of the modules, students wrote a reflection, and the results of the study showed that students were able to reflect on their own experiences of working in multicultural teams, developed an understanding of various communication and pacing styles, and were able to develop strategies on how to communicate with someone from a different culture [3]. This incorporation of the intercultural lens was an opportunity for students to learn about the challenges of teamwork and cross-cultural communication that exist in the real world and reflect on strategies to overcome them. Similarly, another recent study conducted in a first-year computer science seminar course

revealed that incorporating the aspects of intercultural competence into the curriculum helped students to develop openness towards other culture and mindfulness when interacting with others [5]. Helping first-year students develop intercultural skills such as openness and mindfulness can go a long way as it can help them to reflect on their learnings and grow into globally adept professionals [17] .

Since the field of intercultural competence and STEM education is relatively new, there are limited studies conducted at the intersection of the two [3], [5], [18]. Therefore, this study intends to showcase an evidence of incorporating intercultural competence into a cybersecurity course. The ASKS2 survey and student reflections were used to assess the understanding of the students' intercultural competence. The study used a multi-method approach to answer the following research questions: i) How do first-year cyber security students self-identify in terms of intercultural competence? ii) What is the nature and strength of the relationships between different dimensions of intercultural competence as measured by the ASKS2 Scale among first-year cybersecurity students? iii) What are the perceptions of students regarding the intercultural concepts that they learned through this course?

Methods

Context and Participants

The study was conducted in an introductory-level cybersecurity and systems development course in the fall semester of 2022. Over the semester, topics pertaining to cybersecurity such as risk analysis and management, the confidentiality-integrity-availability (CIA) triad and data confidentiality and privacy were covered. In addition, information technology (IT) systems development topics such as requirements analysis, systems design using unified modeling language (UML), and database design were covered. The course was comprised of 118 students enrolled in their first year of college education who were pursuing a Cybersecurity major. In terms of course structure, students were required to attend two lecture meetings every week with each meeting having a duration of 50 minutes. In addition, students were required to attend a laboratory section where they were given additional instruction about information systems modeling and database concepts. Students were also randomly assigned to teams to work on a semester-long project with each team comprising of four to six members. The project involved the application conceptual knowledge covered in the lectures to the end of identifying and modeling systems requirements in addition to developing security plans and implementing a database.

Intercultural Competence Intervention

Inorder to help students understand the need and importance of intercultural competence, two portable intercultural modules (PIM) focused on intercultural competencies were integrated into the course. These PIMs were introduced in the 6^{th} and 10^{th} week of the semester, respectively. Both PIMs required students to view videos and complete activities and readings, following which their knowledge was tested in the form of quizzes and written reflections. The two specific PIMs that were utilized in this course, and they are titled "Productive Conflict" and "Tricky Communication: Intent vs Impact" respectively. The PIM on "Productive Conflict" helped the students to view teamwork conflict as constructive. This PIM helped the students understand in what ways productive conflict can lead to building trust across culturally different peers, promoting creative problem-solving, improving mutual understanding, and strengthening

relationships by navigating cultural differences. It also allowed students to reflect on ways to turn potential challenges into opportunities for growth and innovation. As a capstone activity, students completed a case study that focussed on a web development team consisting of team members from diverse backgrounds trying to solve a work conflict. The students were required to reflect on the case and propose solutions to mitigate the conflict. The overall goal of this module was to help students develop openness, empathy, world-view, and cultural self-awareness. The PIM on productive conflict was delivered in the lab sections of this course and focused on topics such as conflict styles and trust. Students were also asked to reframe conflict they have encountered in the past [16].

Meanwhile, the PIM on tricky communication focused on the intent vs. impact of the communication. This PIM helped students to learn and reflect on their communication styles and understand the complexity of cross-cultural communication. For example, non-verbal communication such as, eye-contact can greatly differ from one culture to another. Students were taught strategies to bridge the communication divide and respond accordingly. Upon completion of the module, students completed a case study and were required to analyze the intent and impact of the conversation between the two characters in the case and propose strategies to overcome the situation. The goal of this module was to help students develop knowledge of verbal and non-verbal communication styles, worldview, openness, and curiosity. Moreover, the PIM on tricky communication [19] was prefaced with a TedTalk presented by Julien S. Bourrelle about learning new cultures and what that could entail. An additional reading on the differences between the intent and impact of communication was also supplied. The goal of the TedTalk and reading was to foster worldview, openness, cultural self-awareness, and curiosity among the students. Upon completion of the Tedtalk, readings, and PIMs, students were then asked to participate in an online discussion forum by detailing their thoughts on learning about new cultures and whether they could apply anything from the talk, PIMs or readings in their everyday interactions. The goal of these intercultural activities was to equip students with knowledge, skills, and attitudes to engage in intercultural interactions while having an appreciation for cultural differences. To assess the intercultural competence development of the students at the end of the course we used a post-only ASKS2 survey. All the students were required to complete the ASKS2 survey at the end of the course. The survey is designed on the six dimensions of the AAC&U rubrics they are cultural self-awareness, worldview, openness, curiosity, empathy and knowledge of verbal and non-verbal communication.

Data Collection

The study used a multi-method research design to assess the intercultural competence development of cybersecurity students. The data for this study was collected in the form of survey and reflections. The survey and the reflections were conducted at the end of the semester. To answer our first and second research questions the survey data was used. The survey used for this study is known as the ASKS2, a short-scale survey. This survey is developed on the principles of AAC&U Intercultural Knowledge and Competence rubrics. The goal of the rubrics is to assess the participants on the following six dimensions: openness, curiosity, communication, empathy, world-view, and cultural self-awareness. It uses a 6-point Likert scale, 1 being the *I am not aware of or do not recognize this behavior* and 6 being that *this behavior is natural to me, is habitual to me, and embodies who I am*. Table 1 represents the sample survey questions, and complete survey is accessible at:
https://www.purdue.edu/cie/globallearning/ASKS_version3_combo.pdf

Table 1: Sample questions from the ASKS2 Survey

Dimension	Sample Questions ***[As a result of participating in this intercultural experience I am able to:]***
Openness	Welcome and initiate interactions with people who are culturally different from me
Curiosity	Ask questions about other cultures different than my own
Communication	Understand differences in forms of verbal communication in different cultures
Empathy	I act in a supportive way that recognizes the feelings of other cultural groups.
World-view	Act in a supportive way that recognizes the feelings of other cultural groups
Cultural self-awareness	I am aware of how my own experiences have shaped my personal rules or biases about cultural differences.

To answer our third research question, the reflection responses from the discussion forum was analyzed. All the students were required to complete the reflection questions on the discussion forum. They were required to reflect on the following reflection questions :

- Why is it important to learn about other cultures?
- What new information did you gain from the videos, readings, or PIMs, and how it applies to you?
- How does the message in the videos, readings, or PIMs apply to regular interactions that you have with students and peers in the classroom or on campus?

Data Analysis: The data was analyzed using a multi-method approach [20], [21] . The survey data (quantitative) were analyzed using descriptive statistics; the goal was to understand the mean and the spread of the dataset. We also created box plots to visualize the descriptive statistics data, To further interpret the score we created the following metric, this categorization was done based on the feedback from a senior assessment expert, see Table 2. Similar methods of score categorization have been used by prior studies, see [22].

Table 2: Interpretation of ASKS2 Survey scores

Mean Survey Score Range	**Interpretation**
1.00 – 2.99	Low
3.00 – 4.99	Moderate
5.00 -6.00	High

Further, correlation analysis was conducted to understand the relationship and strength between the ASKS2 dimensions, and correlation has been identified as an effective method for understanding how different dimensions of a survey are interlinked [23]. Heatmaps were generated to visualize the correlation data. The reflection data was analyzed using inductive thematic analysis. Steps delineated by Braun and Clark [24] were followed to conduct the analysis. To conduct the qualitative analysis, first open coding was performed; in this process, thirty percent student posts were read by two raters, and initial codes were generated. In the next

round, raters met under the supervision of a senior peer who was not the part of the project and discussed their codes. Senior peer helped the raters to create a code book. In the third round, raters coded the data based on the codebook, and peer debriefing was conducted [18], [25]. Based on the feedback, the codebook was modified, and the data was recoded. After the third round of coding, the raters again met with the peer, and this time, there was a good overlap between the coding patterns of the two raters. The rest of the data was independently coded by the two raters based on the revised codebook. In the last phase, the raters, along with the peer, combined the codes into categories and generated the final themes.

Results

In order to answer our first research question, we conducted descriptive statistics, based on the results, we can interpret that students demonstrated a high degree of *openness* (M=5.01, SD =0.84), which indicates strong receptiveness to new experiences, ideas, and diverse cultures, reflecting an interest and willingness to explore unfamiliar situations. The students showed a moderate level of competence in understanding the worldview (M=4.91, SD=0.77). The score suggests that students had a reasonable understanding of global issues and perspectives, but there might be scope for broader and more nuanced global awareness. The third highest score was for empathy (M=4.84, SD=0.85), which reflects that students showed the ability to understand others' feelings and perspectives, but there might be opportunities for deeper empathetic engagement. The scores for communication (M=4.69, SD=1.04), shows students were moderately competent in communicating, both in understanding and expressing ideas effectively, but there may be potential for further refinement and enhancement. Scores for cultural self-awareness (M=4.69, SD=0.74), showed that students have a good level of understanding of their own cultural influences and biases, yet there could be deeper levels of self-reflection and understanding to be achieved. Lastly the score for curiosity (M=4.62, SD=1.06) indicates that students have a moderate level of inquisitiveness and a desire to learn and explore new cultural aspects. However, this score also implies that there is room for further development in fostering a deeper sense of curiosity and eagerness to investigate and understand various cultural aspects. The box plots below show the scores for each dimension, see Figure 1.

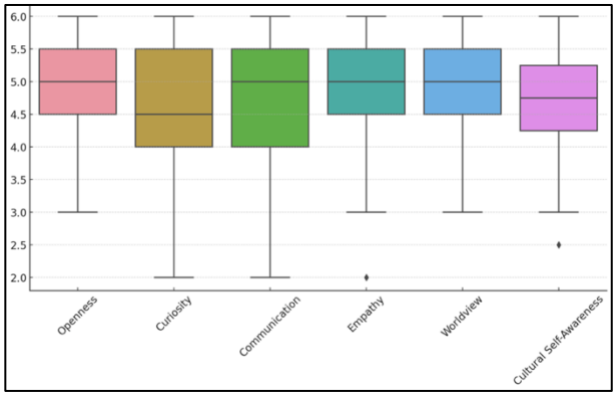

Figure 1: Box Plots for each dimension of ASKS2 survey

A correlational analysis was conducted to answer our second research question and understand the relationship between the various dimensions. The heat map (Figure 2) shows the correlation coefficients for each dimension. The darker values in the matrix show a high association between the dimensions. We used the interpretation by Ratner [26] to interpret the correlation scores. For

example, Empathy and Cultural Self-Awareness have a correlation coefficient of (0.78). This is the strongest correlation observed among all the dimensions. It suggests that individuals with high empathy scores tend to also have high cultural self-awareness scores, and vice versa. This might indicate that these two attributes are closely related or often develop together. The dimensions Communication and Cultural Self-Awareness also indicate a strong positive correlation (0.73). This shows that students who had a good understanding of communication skills also tend to have higher cultural self-awareness. A moderately positive correlation was observed for the following dimensions Curiosity and Empathy (0.69), Openness and Empathy (0.69), Worldview and Empathy (0.67), Curiosity and Openness (0.65), Worldview and Cultural Self-Awareness (0.62). Lastly, a low positive correlation was observed between Openness and Communication (0.35). No negative correlations were observed for any of the dimensions.

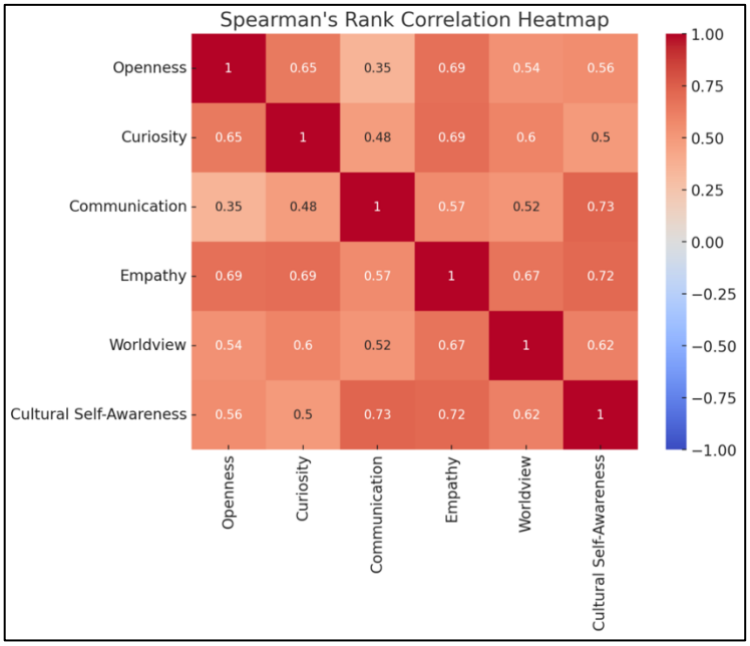

Figure 2: Heat Map for the dimensions

Qualitative Analysis Results

To answer our third research question, we conducted a thematic analysis. The three broad themes that emerged from the data set are:

Theme 1: Learning about other cultures is crucial to bridge communication differences across cultures

Theme 2: Learning about other cultures helps to become mindful and care for people who are different from you

Theme 3: Learning and reflecting on cultural values and differences has helped me to learn teamwork skills.

In the paragraphs below, we have the themes and representative student quotes.

Theme 1: Learning about other cultures is crucial to bridge communication differences across cultures: Under this theme, students in the cybersecurity course expressed their views on the importance of understanding and adapting to various cultural communication styles. For example, reflection of Student 1 emphasizes the significance of cultural context in communication. He notes,

> *"You can do or say the same thing to two people from different cultures, and to one person it may be normal, and to the other you may have terribly offended them. Many large disputes in the past have been due to a lack of understanding and miscommunication due to cultural differences that could have been avoided if people were more receptive to learning the other's culture."*

This statement highlights how a deep understanding of communication aspects, such as idioms, humor, and gestures, can vary across cultures. As Student 1 emphasized, the same communication style can be approached differently by people from different cultures; therefore, it is crucial to learn about the communication expectations of other cultures.

Similarly, Student 5 acknowledges the complexity of intercultural communication and the benefits of being attuned to these differences. She points out,

> *"Communication methods, manners, and nonverbal clues vary between cultures. Understanding and appreciating these subtleties will help us negotiate cross-cultural encounters more skillfully, reducing misunderstandings and misinterpretations."*

Student 5's remark emphasizes the role of methods, manners, and nonverbal cues in regular communication. She further elaborates on the need to understand and appreciate them. Student 5 also advocates the need to actively adapt communication strategies to fit various contexts.

From the first theme, we can conclude that understanding cross-cultural communication skills is crucial for students, especially when working with diverse others. Particularly, in cybersecurity, where effective collaboration and problem-solving depend on the ability to connect and engage with colleagues from different cultural backgrounds, understanding and acknowledging the communication styles of the teammates can help develop good team dynamics.

Theme 2: Learning about other cultures helps to become mindful and care for people who are different from you. This second theme emphasizes the importance of being mindful, tolerant, and open to other cultures. The student experiences and reflections offer a deeper understanding of how engaging with diverse cultures enriches them as an individual.

Student 6's statement encapsulates this theme well. She expresses,

> *"I firmly believe that learning about other cultures and traditions is essential and important. It allows us to appreciate different ways of living and thinking around the world while also broadening our minds to accept people who are very different from our families and friends."*

This reflection echoes the value of cultural learning in promoting openness, tolerance and a deeper appreciation for other cultures. It also shows thoughtfulness in understanding and

appreciating the cultural values different from her own and shows an attitude to embrace the differences.

Student 6 further delves into her personal experiences, and she reflects,

> *"My family has hosted foreign exchange students over the years, so it was very beneficial for me to learn from them and see that there's a lot I didn't know. Humbling yourself to accept that your ways are not the 'end-all-be-all' or correct and acceptable truly allows you to live across cultures as a better human."*

This reflection on the personal experience highlights the importance of humility in intercultural interactions. Student 6's experiences with foreign exchange students showcases her willingness to learn new behaviors and cultural norms. Such experiences are crucial in developing the ability to approach intercultural interactions with an open mind, a skill that is increasingly important in globally interconnected STEM fields.

Theme 3: Learning and reflecting on cultural values and differences has helped me to learn teamwork skills.

Theme 3 highlights the role of cultural understanding in fostering effective team dynamics. The reflections of the students, offer valuable insights into how this understanding translates into practical teamwork skills, which are essential in any collaborative environment.

Student 10 describes his teamwork experience while working with people from diverse backgrounds during the class project. He shares,

> *"I learned good ways to apologize, how to communicate about a tough topic that may upset the other person. I also learned that there is a huge difference between intent and impact. Someone can have an intent of making a comment that sounds okay in their mind but then when the person hears the comment, it could give them a different impact or reaction than it was anticipated."*

Student 10's reflection emphasizes the importance of mindful communication. His realization about the disparity between intent and impact is particularly relevant in diverse teams, where misunderstandings can arise if team members are not culturally cognizant. Student 10 emphasizes the need for careful consideration of how words and actions might be perceived by team members from different cultural backgrounds, a skill critical in maintaining a cohesive and respectful working environment.

Student 14's reflections further elaborate on this theme. She says,

> *"It applies to interactions in the team because everyone comes from different places with different traditions and mannerisms that we should be more accepting of even though they may seem rude or weird to us. Like Julien was saying, 'challenge yourself to see the world in the perspective of others, challenge yourself to be more aware of your biases, your own expectations, and in the way you perceive other people's behaviors.' I would like to say that I've always done this but more from a child-like curiosity, instead of truly*

understanding the differences I encounter or my biases and appreciating how other people act or perceive the world around them."

Student 14's reflection points towards the value of cultural acceptance and self-awareness in teamwork. Understanding and respecting diverse communication styles, behaviors, and manners not only enhances team cohesion but also enriches personal growth. Moreover, Student 14's reflection on her journey from a child-like curiosity to a deeper appreciation of cultural differences illustrates the transformative power of cultural learning in developing empathy and open-mindedness.

Discussion

The goal of this paper was to investigate how intercultural learning can be incorporated into STEM curricula. With this goal in mind, we used a multi-method approach and aimed to answer three research questions. First, how do first-year cyber security students self-identify in terms of intercultural competence? In order to answer our first research question we used the data from the Attitudes, Skills, and Knowledge Short Scale (ASKS2) survey. The ASKS2 survey is developed on the dimensions of the AAC&U IKC rubrics, the survey was conducted towards the end of the course and results of the descriptive statistics revealed that students showed a high degree of openness, average score of 5.1 on a 6-point rating scale and considered openness an important behavior while interacting with people from diverse backgrounds. For all other dimensions, the mean score was between 4.1 to 4.9 on a 6-point rating scale, indicating a moderate level of competence. From the scores, it can be interpreted that the students did recognize the value of communication, empathy, worldview, curiosity, and cultural self-awareness when interacting with other cultures, though not quite at the same level as openness. Given this, instructors need to create more opportunities for students to reflect and engage in intercultural interaction to help students internalize these values.

The second research question focused on understanding the relationship between various dimensions of ASKS2 Scale, the research question was what is the nature and strength of the relationships between different dimensions of intercultural competence as measured by the ASKS2 Scale among first-year cybersecurity students? A correlation analysis was conducted to understand the relationship, based on the analysis we found that there was strong positive correlation between Empathy and Cultural Self-Awareness (0.78) and Communication and Cultural Self-Awareness (0.73). This showcases that if we focus on increasing the cultural self-awareness among students, the understanding of communication and development of empathy will improve. In contrast, a moderate positive correlation was observed for Curiosity and Empathy (0.69), Openness and Empathy (0.69), Worldview and Empathy (0.67), Curiosity and Openness (0.65), Worldview and Cultural Self-Awareness (0.62). Specifically, the correlations between Curiosity and Empathy, and Openness and Empathy, both at 0.69, suggest that students who exhibit a higher degree of curiosity about new experiences or are more open to different perspectives tend to demonstrate greater empathy. This relationship emphasizes the interconnected nature of being receptive to new ideas and the ability to understand and empathize with others. Similarly, the correlation between Worldview and Empathy at 0.67 reinforces this pattern, indicating that a broad or inclusive worldview often aligns with higher empathy levels. The correlation between Curiosity and Openness at 0.65 further suggests that a desire to learn or explore (curiosity) often goes hand-in-hand with a willingness to embrace new people and experiences (openness). Lastly, the correlation of 0.62 between Worldview and

Cultural Self-Awareness implies that those with a more extensive understanding of different cultures and perspectives also tend to have a better grasp of their own cultural influences and biases. Collectively, these moderate correlations illustrate that while these aspects of intercultural competence are related, they are not so strongly linked that one can predict another with high certainty. Overall, understanding the relationships between the dimensions is important for designing and integrating intercultural competence interventions for a course as it correlation allowed to understand what dimensions of the ASKS2 scale are interlinked and how empahsising on one can lead to another.

The third research question was: what are the perceptions of students regarding the intercultural concepts that they learned through this course? We used a thematic analysis to answer this question. Three major themes emerged from the reflections: i) understanding other cultures is vital for bridging communication gaps, ii) learning about other cultures fosters mindfulness and empathy toward those who are different, iii) understanding cultural values and differences contributes to the development of teamwork skills. Based on the student reflections we concluded that students were able to understand the concept and importance of intercultural competence. They were able to metacognitively reflect on their personal experiences and share their perspectives emphasizing the need for intercultural competence. From the cybersecurity stand point, it is crucial for students to become cognizant and appreciate people from other cultures, as they will be working with people from backgrounds different than their own.

Implications for teaching and learning

Overall, the results of the study suggest that instructors need to mindfully create an integrated curriculum that helps students to develop in each of the six dimensions of intercultural competence. Namely openness, empathy, cultural self-awareness, worldview, communication and curiosity. To develop in all the six dimensions, instructors must design a collaborative learning environment that allows students to work with those from differing backgrounds. Students should be engaged in individual and group reflections so that they can make meaning of their learning process. Instructors need to incorporate discipline-specific case studies that help students appreciate the need for intercultural competence in their discipline. By adopting these approaches, educational programs can more effectively equip students with the skills necessary to navigate and contribute positively in a globally interconnected world.

Conclusion, Limitations, and Future Work

The results from the study suggest that first-year Cybersecurity students recognized the importance of openness in interactions with those from other cultures while also recognizing the value of communication, empathy, worldview, curiosity, and cultural self-awareness. As such, the onus is on instructors to facilitate such interactions within the framework of their courses. This is especially important given the interconnected nature of the aforementioned constructs and how the development of intercultural competence can result in improving teamwork skills which is essential in today's global workplace. This study was exploratory in nature and such no causal claims can be made with regard to the Cybersecurity students' intercultural competence and its relationship to the survey responses that they made or their reflection responses. Furthermore, this study did not evaluate the effect of any intercultural learning intervention introduced as part of the course and its effect on students' self-reported intercultural competence. Future inquiry could include student interviews to gain further insights into students' thinking and rationale in

intercultural environments. We also plan to conduct a pre-post assessment on intercultural competence using the ASKS2 scale, so assess the intercultural development of the students.

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