



Article

Information Technology Undergraduate Students' Intercultural Value Orientations and Their Beliefs about the Influence of Such Orientations on Teamwork Interactions

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Abstract: Companies and their executives are concluding that to accomplish their complex tasks and all-encompassing missions and goals, they must step outside the traditional realms of teamwork and partnership and engage in cross-cultural and multinational alliances. One of the principal areas affecting teamwork today, especially in diverse workplaces, is the variety of cultural value orientations that the members relate to. To better prepare students for joining global enterprises, it is necessary to understand their cultural orientations and how those may influence their teamwork interactions. This study used a mixed methods design to characterize computer and information technology undergraduate students' cultural orientations and their cultural awareness in the context of teamwork experiences. The data for the study was collected in the form of a reflection assignment that was implemented during the first week of classes as a way to promote students' cultural awareness and how that may play out in their teamwork interactions. The reflection assignment had two parts: (i) a survey and (ii) reflection questions. The study used descriptive statistics and *t*-tests to analyze the survey (quantitative data), and thematic analysis was conducted to analyze the reflection questions (qualitative data). Our analysis of the quantitative data revealed that students identified the following core values they are Individualism, Equality, Monochronic, Meritocracy, Informality, Personal Efficacy, and Directness, and these values resonated with most of the students in class. Corresponding qualitative themes that emerged regarding students' beliefs of how those values may play out in their teamwork experience were (a) Treating everyone equally and understanding others, (b) Increasing temporal Awareness, (c) Enacting effective communication, (d) Monitoring the progress of team members and (e) Establishing rules and boundaries.

Keywords: cultural awareness; cultural value orientations; information technology; undergraduate students; reflection prompts; teamwork



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1. Introduction

In today's world, teamwork and collaborative efforts are the driving force of modern organizations and educational institutions. The values of teamwork efficacy and potency are instilled in learners at an early age and are continually tested and practiced through various situational and group work assignments. These values then become essential as students navigate outside of the laboratory and group assignments and step into the professional world. The same emphasis on teamwork applies to companies as well. With firms facing market demands and competition, the need for physically unbound operations is ever-growing. Companies and their executives are concluding that to accomplish their

complex tasks and all-encompassing missions and goals. They must step outside the traditional realms of teamwork and partnership and engage in cross-cultural and multinational alliances [1]. The focus has already shifted from individual work to teamwork in many industries [2]. Researchers in the past decades have been tasked with identifying methodologies and strategies to improve the potency and effectiveness of teams in a variety of settings [3].

However, effective teamwork is not solely about how various members accomplish tasks and responsibilities together, but the ideologies extend to other factors as well. One of the principal areas affecting teamwork today, especially in diverse workplaces, is the variety of cultural value orientations that the members identified by [4,5]. In educational settings, there have also been numerous research studies undertaken to understand the effects of culture on teamwork, the academic well-being of students, and their interactions when placed in a team setting [6]. Nonetheless, there appears to be a lack of studies on the intersection of cultural orientations, teamwork, and information technology teams.

Due to the increasing demand for information technology professionals, it can be simple to overlook the importance of culture and language in how students learn inside and outside of the classroom [7]. Studies have revealed that students find it challenging to work in diverse teams [8]. Therefore, colleges need to prepare students with viable and necessary technical and professional skills so that they can thrive in the workplace. What has not been evident but starting to be understood in academia is the effect of teamwork training and pedagogy that has been built into college curriculums [9]. It is imperative to understand the way students best learn in a collaborative environment, as with so much diversity comes a wide variety of cultural and language differences.

This research aims to characterize computer and information technology undergraduate students' cultural orientations and their cultural awareness in the context of teamwork experiences. The research questions for this study are:

RQ1 (Quan) What are undergraduate students' intercultural value orientations?

RQ2 (Qual) What are the students' beliefs about the influence of their cultural value orientations in the context of teamwork?

2. Background

With the turn of the century, employers have shifted to a managerial structure that encourages teamwork primarily, as improvements along the workplace pipeline have made group work possible. In addition, formal teamwork training has made its way as common practice within organizations [10,11].

Specifically, in higher education, it is crucial to establish effective teamwork training related to teamwork behaviors and team performance [12]. Research on teamwork training has indicated that each team has different requirements to remain effective [13]. Due to this requirement differentiation, it is not possible to create a common teamwork training plan that could be applied to all teams. Therefore, research on teamwork training has proposed various methods to deliver training. For example, studies have investigated the effectiveness of multiple training formats, such as didactic education in a classroom-type setting [14,15], interactive workshop-style format, and simulation training [16]. The results pointed to an improvement across the board where teamwork training was implemented, but the conclusions were not equal. The study concluded that the type of training performed resulted in different outcomes. Although both simulation training and interactive workshops resulted in large improvements, the didactic classroom-type setting did not conclude in significant improvements in teamwork itself [16]. This finding suggests that providing educational resources is not sufficient. Rather, collaboration and interactivity of education itself can instill greater success. Although research has identified the effects of teamwork training and pedagogy [9], research on teamwork training with a specific emphasis on intercultural competence has primarily taken place for facilitating virtual teams [17]. Thus, more research is needed that contributes to the understanding of the role of culture in teamwork.

Developing cultural competency, meaning the understanding of various cultures and their integration within a discipline, is also an aptitude needed to effectively interact and operate with others [18,19]. Cultural competency involves a set of knowledge and skills, but a precursor of those is an awareness of an individual's own culture. Cultural value orientations can serve as a way to understand cultural self-awareness. Research on cultural value orientations has identified ways to dimensionalize culture into six different orientations [20]. The dimensions are power distance, uncertainty avoidance, individualism versus collectivism, masculinity versus femininity, long-term versus short-term, and indulgence versus restraint. Yet again, a comparative analysis can be made that the dimensions are far too broad to be applied to niche and specific disciplines. The significance of the dimensions is that, although foundational, they can be applied to other studies which observe culture and language from a team-based perspective.

Cultural value orientations can also be used as a mechanism for team members to understand each other. For instance, Hofstede concluded that when teams are formed of team members with distinct cultures, there may be a difference in their performance when there is no understanding of each other [20]. If there is a lack of understanding between each other, there is a high possibility of conflict during the project, and it will undermine the quality and creativity of teamwork [21]. However, it is also important to point out that when teams are formed with members from various nationalities and cultures, there are several advantages, including (1) having access to different kinds of information, (2) increasing team identity, which directly affects team cohesion and innovation; and (3) promoting team cooperation by helping and explaining to each other [6]. Therefore, it is important to understand personal, social, and cultural values and, by doing so, increase the potential of having a positive impact on the team.

A second model proposing a complementary set of cultural value orientations is the theory of cultural value orientations proposed by Schwartz [16]. According to Schwartz, culture is a complex system of meanings, beliefs, behaviors, symbols, standards, and values. This has an impact on every aspect of our existence, including our way of life. Beyond personal culture, the value that is prioritized in society expresses cultural ideas [22]. Groups have shared cultural values about what is right and attractive. The beliefs, deeds, and objectives of individuals and groups are shaped and justified by cultural values. It encourages consistency among diverse facets of culture as a trait of cultural value orientation. Due to the cultural element's long lifespan, it is stable and subject to change from outside forces like technological advancement and contact with people from distinct cultures.

As civilizations deal with fundamental concerns or difficulties in managing human activity, cultural value orientations change. Yet, the changes are gradual, with elements of culture persisting over time [23]. These issues must be acknowledged, solutions must be planned, and support must be provided for one another to deal with them. It is possible to pinpoint aspects on which cultures may differ from one another by seeing how societies respond to these fundamental challenges or difficulties. The first orientation relates to the boundaries or nature of the relationship between the individual and the group. How much do people rely on autonomy and being part of a group? Through this, it can be divided into autonomy and embeddedness [16]. People are seen as autonomous, bounded beings in societies that value autonomy. In contrast, people are seen as entities embedded in the collectiveness of cultures that place a strong emphasis on embeddedness.

The next orientation relates to individuals acting in a way that upholds the social fabric. In other words, instead of engaging in harmful competition or refusing to put out any effort, people must engage in the productive activity required to uphold civilization. There is egalitarianism and hierarchy [16]. Egalitarianism persuades individuals to consider one another as moral equals who share fundamental human interests. Hierarchy depends on ranked structures of assigned duties to ensure responsible and productive behavior. Another orientation considers how people handle their interactions with the social and natural worlds. For this, harmony should try to comprehend and enjoy the world as it is rather than trying to control, direct, or exploit it. On the other hand, mastery promotes

aggressive self-assertion to control, direct, and alter the physical and social environment to achieve personal or collective objectives [16].

In summary, the theory of cultural value orientations, in its entirety, identifies three bipolar cultural dimensions that stand in for opposing approaches in all societies: embeddedness vs. autonomy, hierarchy vs. equality, and mastery vs. harmony. The dimensions each provide a glimpse into the nature of interactions among individuals within varied cultures, but together form a complete picture of how cultural values stand in contrast to other values.

3. Theoretical Framework

The theoretical framework that was used as a foundation of this investigation was that of Hall's Context Theory. Unlike Hofstede's comprehensive study to classify values in the workplace as influenced by culture, Edward T. Hall [24] argued that cultural differences could be better understood if the cultures around the world were divided into two distinct groups: high context and low context cultures. High-context nations, such as those in the Middle East, Asia, Africa, and South America, regard themselves as relational, collectivist, intuitive, and contemplative. In other words, the people from these cultures place heavy emphasis on interpersonal relationships and the value of tradition. Interactions in these cultures are less governed by logic and reasoning and more based on intuition and feeling. In face-to-face conversation, words do not mean as much as the context of the person does, like their gestures, posture, and expressions.

On the other side of the spectrum exist low-context nations. North America and much of Western Europe follow this principle. These cultures are logical, linear, individualistic, and action-oriented. Unlike those from high-context nations, people from these cultures value logic and directness as opposed to context and intuition. Decisions made by these individuals are often based on rationale, and their discussions end with action. Face-to-face conversations are meant to be straightforward and efficient, with absolutely clear communication.

4. Methods

The sections below describe the context, participants, data collection, and analysis methods used for this study. For approaching the two research questions for the study, we used a mixed-methods design [25], in which qualitative and quantitative data sources were collected, analyzed, and integrated to discuss the findings of the study.

4.1. Context and Participants

This study focused on a second-year systems analysis and design course offered at a large Mid-Western University in the Fall of 2022. The class consisted of a total of 125 students. The course aimed to present an overview of the approaches used by today's information system developers to discover and model the requirements, then construct and prototype an acceptable design to implement a successful system solution. The course applied the tools and techniques used in IT industries to perform systems development.

According to institutional data, the course demographics consisted of 104 (83%) male students and 21 (17%) female students. The ethnic background of the students participating in the study is shown in Table 1. Of those, 21% of the students in the course identified as international students, while the other 79% consisted of domestic students from the United States. The percentage ratio of international to domestic students in the course is representative of the international-to-domestic student ratio at the university level. Most of the students in the course were in the second year of their college education and were either pursuing a general computer and information technology or a cybersecurity degree.

Table 1. Demographic Details.

Race	Number of Students Identified	Percentage Ratio to Overall Class Size
White	46	36.8%
Asian	37	29.6%
Hispanic/Latino	5	4%
Black/African American	4	3.2%
2+ races	31	24.8%
Unknown	2	1.6%

The students enrolled in this course were required to complete an introductory systems development course as a prerequisite as well as having experience with programming through prior coursework and/or practical experience. The students also have developed some teamwork experience, having taken a design thinking in technology course in their first year, where they were organized into teams consisting of four or five members working on collaborative projects.

4.2. Procedures and Data Collection Method

A reflection assignment was implemented during the first week of classes as a way to promote students' cultural awareness and how that may play out in their teamwork interactions. For this, the "Core Cultural Values & Culture Mapping" was used as guidance for a self-assessment and a reflection. Building on the work of Hofstede [20] and Schwartz [26], Cohen and Paige [27] created the "Core Cultural Values & Culture Mapping" assessment. This assessment includes nine dimensions, and the values are as follows: individualism/collectivism, equality/hierarchy, polychronic time/monochronic time, meritocracy/ascription, activity/people change, progress, risk thinking/stability, tradition, risk aversion, formality/informality, fate, and destiny/personal efficacy, directness/indirectness. Each dimension is further defined as described in Appendix A. By using this assessment. Participants can directly reflect upon and evaluate nine contrasting cultural value orientations. It is also important to note that none of the value orientations are positive or negative. The continuum indicates the preference of the respondents for the two contrasting values on a scale of 1 to 8, 1 being the and 8 being high. The student responses on a scale of 1 to 8 served as quantitative data for the study. The qualitative data was collected in the form of student reflection. Students were also required to answer the reflection questions to spur thought on the orientations they ranked and to allow them to clarify which ones mattered to them the most. The reflection questions intended to understand the student perception of the selected value orientations on teamwork interaction and strategies to help students to improve team interaction.

4.3. Data Scoring and Data Analysis Methods

To approach the first research question, student responses on a scale of 1 to 8 for the contrasting value orientation were used. Descriptive statistics were used to calculate the mean, which is visually represented in Figure 1. Further *t*-tests were conducted to compare the mean score for each value orientation for all nine categories. To approach the second research question regarding students' level of awareness of how their cultural value orientations may influence their teamwork experience, students' responses to the reflection questions were analyzed using thematic analysis. The thematic analysis techniques used were outlined by Braun & Clarke [28] in their inductive qualitative analysis procedures, which broke down the process into six main steps: familiarizing the data, producing initial codes, examining initial codes for themes, reassessing the themes generated from the initial codes, define and identify each of the themes, and finally, compile all the results into the final report.

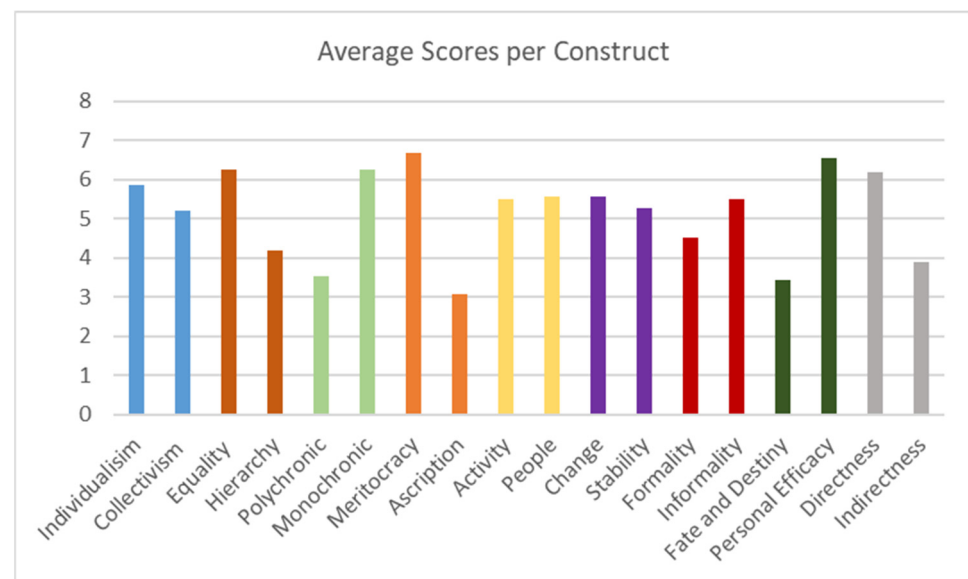


Figure 1. Bar plots represent the scores for each core value orientation.

4.4. Ethical and Trustworthiness Considerations

Before initiating any data collection, the investigators obtained ethical approval from the institutional review board under protocol number protocol code IRB-2021-1181, and the date of approval was 20 August 2021. According to the Human Research Protection Program (HRPP), the project qualified as exempt because it was conducted in established educational settings with normal education practices. Specifically, it fits the category of research on the effectiveness of regular educational strategies.

To ensure the trustworthiness of qualitative data, two researchers jointly analyzed the full data set. Specifically, during the qualitative coding process, a first version of a codebook was initially developed and validated through an interactive process. The two researchers then performed inter-rater reliability. The initial coding process resulted in a 67% agreement. To increase the trustworthiness of the analysis, the researchers coded the data again, and a peer debriefing [29] was conducted to check and compare the accuracy of the coding process.

5. Results

Since the study utilized a mixed-methods approach, the subsequent section presents the quantitative results in the form of the bar plot and *t*-test scores. The qualitative data analysis results are represented in the form of themes.

5.1. Quantitative Results

The bar chart in Figure 1 displays the average scores of all students for each value orientation. The eighteen values are represented in Figure 1. Each color represents a pair of contrasting values. For example, individualism and collectivism are in blue in a pair of contrasting value orientations. Looking at Figure 1, it is evident that students resonated more with the following core values Individualism, Equality, Monochronic, Meritocracy, People, Change, Informality, Personal Efficacy, and Directness as they represented the value orientations with higher average scores than their corresponding contrasting values.

Further, to compare the means of each contrasting value orientation *t*-test was conducted. Table 2 represents the *t*-test scores and *p*-values for each contrasting value orientation. From Table 2, we can interpret that there was a statistically significant increase for the following core values from their contrasting others, Individualism, Equality, Monochronic, Meritocracy, Informality, Personal Efficacy, and Directness.

Table 2. Comparing the mean score for each contrasting value orientation.

	Core Values	Mean	SD	T	p-Value
Contrasting Value 1	Individualism	5.85	1.66	2.91	0.004
	Collectivism	5.15	1.60		
Contrasting Value 2	Equality	6.24	1.53	7.44	<0.001
	Hierarchy	4.19	1.94		
Contrasting Value 3	Polychronic Time	3.52	1.89	−8.98	<0.001
	Monochronic Time	6.26	1.70		
Contrasting Value 4	Meritocracy	6.70	1.32	16.24	<0.001
	Ascription	3.07	1.66		
Contrasting Value 5	Activity	5.48	1.65	−0.28	0.777
	People	5.55	1.57		
Contrasting Value 6	Change	5.53	1.62	1.08	0.281
	Stability	5.26	1.62		
Contrasting Value 7	Formality	4.52	1.75	−3.40	<0.001
	Informality	5.48	1.69		
Contrasting Value 8	Fate & Destiny	3.39	1.80	−13.79	<0.001
	Personal Efficacy	6.57	1.29		
Contrasting Value 9	Directness	6.20	1.39	9.02	<0.001
	Indirectness	3.93	1.78		

5.2. Qualitative Analysis

Based on the *t*-test analysis, we identified the core values that were appreciated more by the students. Further, to understand student beliefs about their identified cultural value orientation within the context of teamwork interaction, we conducted the thematic analysis for the values that were found statistically significant. Table 3 represents the theme identified and the corresponding value represented.

Table 3. Table representing themes and corresponding core value orientations.

Theme	Value Represented
Treating everyone equally and understanding others	Equality
Increasing temporal awareness	Personal Efficacy, Monochronic Time
Enacting effective communication	Individualism, Directness, Informality
Monitoring the progress of team members	Meritocracy, Personal Efficacy
Establishing rules and boundaries	Meritocracy, Individualism

Theme 1: Treating everyone equally and understanding others. This theme represents the core value of equality, and in this theme, students described how valuing equality could make team members comfortable in the team. This belief describes students' intentions to interact with their fellow team members with minimal biases and increases the overall sense of belonging each member holds towards the team. For example, a student mentioned, "I treat everyone equally, which I think will make all my teammates comfortable with me." Students also described their efforts in seeking to understand and empathize with the other members to create an environment based on respect and mutual understanding, recognizing that each group member has their unique responsibilities within the scope of the project and in their own lives. For example, a student mentioned that to lead a team, it is important to ask, listen, and understand the differences in the team and plan the work accordingly. This student said, "I will need to ask and listen to them [team members] to understand their differences and work accordingly."

Theme 2: Increasing temporal awareness. This theme represents the core value of personal efficacy and monochronic time. Students emphasized the need for each member of the team to develop their internal understanding of the inherent value of time, in conjunction with

the efforts, along with its relationship to the corresponding outputs of the task at hand. For example, a student mentioned how working in teams has taught them patience and also helped them work with the pace of his team members “I have learned how to wait and be patient and follow the speed of the other team members.” Another student mentioned how utilizing time properly is crucial to get the job done “We just have to ensure that everyone is using their time properly and the group members get their job done.”

Theme 3: Enacting effective communication. This theme represents individualism, directness, and informality. Students conveyed the need for clear, appropriate, and direct lines of communication to exist between each of the team members. This communication was mentioned from two perspectives. The speaker should be able to convey their message shortly and concisely, while the listeners should be engaging in active listening to understand the team’s needs. In addition, team members should be able to speak up for themselves or their fellow team members if a conflict arises within the team. Also, students preferred informal conversation as they were working in a class team with their peers. For example, a student describes the importance of effective direct communication and how it can help to keep the team on track but also acknowledges the individualism of each member and agrees that he needs to understand their differences too. The student mentioned, “I communicate with my peers in an excellent manner to make sure I understand what page they are on to avoid any miscommunications. I do not mean to frustrate any of them, so I will need to ask and listen to them to understand their differences and work accordingly.”

Theme 4: Monitoring the progress of team members. This theme encompasses the values of Meritocracy and Personal Efficacy. Students described that regularly scheduled team meetings are an effective mechanism to keep the team on track and evaluate the progress of the team members. Regular meetings helped each team member inform the group of their progress towards their individual work, as well as describe any difficulties they foresee arising in the near future. This also provided a venue for group members to provide feedback on each other’s work. For example, a student mentioned that as a team, they planned to conduct team meetings at the beginning to ensure everyone was on the same page, and further, they want to conduct short meetings in the future so that they can sort out any issues they have as a team. “We could make a team meeting at the beginning to ensure that we are all on the same page on everything and that everyone respects each other. We could also do short team meetings every once in a while, to make sure we’re still on the same page and speak up if we feel that a group member is not contributing or being disrespectful or is negatively influencing the teamwork in any way.”

Theme 5: Establishing rules and boundaries. This theme represents the values of Individualism and meritocracy. Students outlined plans to clarify specific responsibilities, roles, and expectations for each team member throughout the project, as each team member was responsible for their role. These roles and responsibilities highlighted the individual abilities of each team member based on their own previous performances, understanding, and experiences. For example, a student mentioned that if the roles and responsibilities are divided among the team members, it builds trust and also sets rules; each member knows their deliverables, and it makes the process smooth. “I believe that as long as the work is divided fairly, and each group member trusts each other member. If ground rules are set, members of the group know what expectations are, and it makes things flow smoother.”

6. Discussion

Groups become teams when their members fulfill their responsibilities and cooperate according to their respective roles to achieve common goals. The advantage and goals of teamwork are to be able to achieve objectives and complete tasks that could not be solved alone and create greater cooperation than the sum of individual abilities. However, forming a team alone cannot expect cooperation. Understanding each other and balancing team roles are important among team members, so understanding ourselves and other team members is necessary. Furthermore, teams are becoming diverse, and as a result, interaction among team members is becoming complex [19]. Therefore, having first-hand

knowledge of cross-cultural norms is crucial. Helping students learn about cultural norms and appreciate other cultures can help them to understand people from other backgrounds. Especially in STEM, it is expected for graduates to work with a diverse population after they graduate [14,30].

The study used a mixed methods design to understand the students' perception of value orientations and their beliefs about the value orientation in shaping their teamwork skills. The results of the quantitative study suggest that students identified certain value orientations as important for shaping their teamwork skills. Such orientations were individualism, directness, meritocracy, monochronic, personal efficacy, equality, and informality. Further qualitative analysis of the student reflection was conducted to understand students' beliefs regarding these identified value orientations concerning teamwork. The analysis revealed that students valued equality; they developed temporal awareness but were inclined to get the work done on time and considered time an important measure of success. Students also focused on communicating effectively, assigning roles, and valuing accountability. They also focused on keeping everyone updated by meeting regularly, and lastly, they acknowledged and showcased an understanding of the differences among the team members. One of the potential reasons that core values, such as individualism, directness, and monochronic, were high was because 79% of students in the class were either born or raised in the United States of America, and only 21% were international students. As per Hall's context theory [31], cultures are classified into low-context and high-context cultures based on cross-cultural communication styles. The United States of America is an example of a low-context nation where individuals prefer direct communication [32]. The result also aligns with Hofstede's classification [33] for low-context nations since the people in the United States of America prefer individualism over collectivism. They are also monochronic, meaning that individuals value time and are task-oriented. Since individuals in the United States are more task-oriented and give priority to self-achievements, we also saw that values such as meritocracy, equality, and personal efficacy were valued more than ascription, hierarchy and fate, and destiny, respectively [34]. It is also important to note that students also identified informality over formality, and the reason could be that students were working in teams with peers of the same age; therefore, there is less formality in their behavior. It is also important to note that themes that emerged as the result of the qualitative analysis describe the relationship between cultural value orientation and student beliefs. The themes that emerged showed that student teams are task-oriented as they value team commitment, focus on communication, value the time of team members, conduct regular meetings, and set boundaries for operation. The theme for understanding difference among the team members also indicates that students were gradually developing abilities to acknowledge and appreciate cultural differences. It is also important to note that the class consisted of 21% of students who were international, which allowed students in the class to work with individuals from different cultural backgrounds. Furthermore, only 37% of the population of this course was White, thus also increasing not only intercultural experiences but multicultural experiences too. Working with people from diverse cultural backgrounds allows individuals to learn and respect other cultures [35]. This could be one of the reasons that while working in teams, the students focused on understanding the differences among the team members. Since intercultural learning has a steep learning curve, engaging students in this activity early on in the semester allowed students to learn about the various cultural orientations and reflect on theirs. It is also important to note that research has revealed that STEM students are ethnocentric and find it difficult to work with people from diverse backgrounds [36]. Therefore, conducting classroom activities could help students to learn about intercultural concepts and develop intercultural sensitivity.

Overall, the results of the study are motivating as students were able to identify their cultural value orientations and were able to link them with their perception of teamwork. Developing an understanding of cultural value orientation in the context of teamwork will help students to behave appropriately in an intercultural setting and will also allow students to accept and adapt the differences while working in teams.

Implications for teaching and learning: This study showcases an example of integrating intercultural learning concepts in the STEM curriculum. The results of the study suggest that planning small interventions during regular classroom time can help students to learn about intercultural and multicultural concepts. Allowing the students to work in groups and teaching them about the value of working with someone from different cultural backgrounds can help them to become more inclusive and comfortable while interacting with diverse populations. Moreover, engaging STEM students in reflection activities is an effective learning method as it promotes critical thinking and metacognition [37]. The qualitative results of the study suggested that students valued equality, effective communication, and understanding of others while working in teams. Lastly, the study serves as a foundation for instructors teaching STEM courses and planning to integrate concepts of intercultural learning into their curriculum.

7. Conclusions, Limitations, and Future Work

Findings from our study characterize undergraduate students' cultural value orientations and students' perceptions of how those may influence their teamwork interactions. The study identified the following core values Individualism, Equality, Monochronic, Meritocracy, Informality, Personal Efficacy, and Directness, which resonated with most of the students in class. The themes that emerged from the analysis demonstrated that students viewed teamwork as an important skill and were able to identify strategies to work with students from diverse settings. However, this study is important as it is conducted in an undergraduate-level STEM classroom to make students aware of the various contrasting value orientations across their cultures. The study helped students to develop some cultural awareness about their and other cultures, which serves as an important precursor for developing cultural competence. The study does have some limitations as it uses student reflection to understand the perception of students regarding value orientations; therefore, in the future, we plan to conduct interviews to know more about why students were inclined toward some particular value orientations over others. Moreover, we plan to conduct longitudinal studies to see how the intercultural competence and value orientations of students change as they progress through their undergraduate life. We also plan to conduct week-long intercultural interventions and mentoring for students and assess the effectiveness of the interventions on STEM undergraduate students.

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Informed Consent Statement: Not applicable, as the study was approved as exempt.

Data Availability Statement: Data is unavailable due to privacy or ethical restrictions.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Core Cultural Value Orientations for the Context of This Study Adapted from [27]

Individualism	Collectivism
The primary importance of self. There exists a sense of pride and responsibility for one's own actions and a push toward independence. While advice is sought after from others, ultimately, the responsibility lies with the self. If something is done wrong, the concern lies with how the action reflects upon oneself.	The primary importance of the group. Life decisions and actions are taken with the needs and well-being of the group ahead of oneself. Identity becomes a function of one's membership or role in the group. If something is done wrong, the concern lies with how the action affects the group rather than the self.
Equality	Hierarchy
The belief is that interactions with individuals must have equal footing, recognizing any disparities but not letting them be the foundation of the interaction.	The belief is that interactions with individuals come with status differences, and treatments must be based on their standing. Hierarchy is accepted as a reality of life, providing individuals with a sense of position and significance.
Polychronic Time	Monochronic Time
There is an abundance of time that is at one's disposal, and people are encouraged to use as much of it as necessary. The idea is that life is not governed by time constraints, and events unfold at their own pace.	Time is a valuable resource that must be used wisely. It is crucial to schedule activities based on the block and take significant measures to avoid wasting anyone's time.
Meritocracy	Ascription
Success is determined by actions. Individuals should be evaluated based on their abilities and accomplishments, and their position in society should be attained through efforts. Everything is acquired through hard work.	Success is influenced by a person's identity and origins. One's background plays a significant role in determining their social standing and is also the foundation for interpersonal relationships.
Activity	People
Individuals attribute significance to being productive. They structure their day around activities such as employment, academic pursuits, and socializing with companions.	Socializing with others is particularly important. Rather than arranging activities, plans are organized around individuals. Relationships take precedence over any other tasks.
Change	Stability
Anticipate change and transformation as a means of generating favorable outcomes in life. Encouraging change also implies that people are more inclined to take risks and experiment with novel approaches.	Traditions are valued because they establish a positive cadence in life. Disrupting this rhythm through chance can lead to adverse effects on relationships and the pace of life.
Formality	Informality
The concept that individuals should communicate with each other suitably, taking into account consideration factors such as the person's age and status.	The concept suggests that strict adherence to formality is unnecessary. In other words, excessive formality can hinder effective communication and interaction.
Fate and Destiny	Personal Efficacy
The course of human destiny is predetermined and outside of their own influence. It is commonly believed that their destiny lies in the hands of a superior being. It is considered arrogant to manipulate one's fate.	The belief that individual actions hold significance and that one must manage their own fate in order to achieve desired outcomes.
Directness	Indirectness
Clear and straightforward communication is considered the most effective way to interact with others. When issues arise, it is preferable to address them through direct, in-person discussions. Indirect communication is perceived as unhelpful. As a result, trust is built on the foundation of transparent communication.	Indirect communication is considered the best approach to show respect for others and allow them to maintain their sense of self-worth. Being direct, on the other hand, is regarded as impolite and offensive. Therefore, indirectness is valued for persevering the coherence of the group.

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