CAMPUS DESIGN AND MULTICULTURAL COMPETENCIES OF STUDENTS: A MIXED METHOD STUDY TO EXAMINE THE RELATIONSHIP AND COLLECT DESIGN GUIDELINES FOR MULTICULTURALISM ON CAMPUS

By

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ABSTRACT

To accommodate the increasing diversity at educational institutions and to make diverse students feel welcomed, these institutions are working toward achieving multiculturalism and developing multicultural competencies among students. The multicultural competencies refer to the awareness, knowledge, and skills needed to work with others who are culturally different. Campus physical environment plays a role towards developing multicultural competencies among students but, but few studies examined this relationship. Therefore, the purpose of this study was to explore relationship between physical design elements of campus (i.e., art, signage, interior design, architecture, landscape design and graffiti) and multicultural competencies of university students. To examine this relationship, Astin's Input Environment Output (I-E-O) model (1993) was adopted to create theoretical framework.

The study employed mixed methods. Quantitative data was collected through a questionnaire survey in first phase of the study and qualitative data through a design charrette in the second phase of the study. The objectives of this study were: 1) to perform literature review about designed elements of campus, and their relationship to campus multiculturalism and multicultural competencies of students, 2) to establish a research framework using Astin's I-E-O Model to investigate the relationship between campus design elements (art, signage, interior design of buildings, architecture, landscape design, and graffiti) and multicultural competencies of students, 3) to conduct a survey of college students regarding their perceptions of environmental design elements and their multicultural competencies, and 4) to conduct a design charrette with college students and several other campus community members i.e., diversity experts, interior designers, construction management experts etc. to redesign a space on campus

to enhance multiculturalism and multicultural competencies of students and to collect ideas about space design on campus to enhance multiculturalism.

The findings of the study indicate that there is significant relationship between perception of physical design elements on campus and multicultural competencies of students. Several student characteristics are also significantly related to their perceived diversity support by campus design elements and their multicultural competencies. Age, Ethnicity and interaction of students with diverse people are significantly related to their perceived diversity support by campus physical design elements. Also, gender, ethnicity, nationality of students and their interaction with diverse people are found to be significantly related to their multicultural competencies.

The study has both theoretical and practical implications. Theoretical implication by using Astin's I-E-O model to examine physical environment of campus and its relationship with student's multicultural competencies. Practical implications include the design suggestions provided by charrette participants regarding buildings design on campus to enhance campus multiculturalism and multicultural competencies of students.

To may late Mian Ji (Grandfather) who believed in the power of education and was a strong supporter of higher education.
And to my husband, who has been a continuous source of inspiration throughout my PhD journey.

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Chapter 1
Introduction

1.1 Background

Population in the United States is growing in cultural diversity (Migration Policy Institute, 2019). With this increase, the population dynamics of educational institutions are also changing in diversity (Quaye & Harper, 2015). This increased diversity is causing educational institutions to address the needs of diverse students, to make their students feel welcomed and have a sense of belonging (Strange & Banning, 2015). This has made U.S. higher educational institutions address and work towards multiculturalism in their agenda.

Different scholars have defined multiculturalism in slightly different ways (Reynolds, 2004; Fowers & Richardson, 1996). According to Delgado and Stefancic (2012) multiculturalism is a perspective through which "social institutions should reflect many cultures" (p. 168). In higher education, multiculturalism attempts to present and encourage cross-cultural understanding and discourage discrimination and violence (Canadian Heritage, 2004, p.1) through different means i.e., curriculum design, extra calicular activities, study abroad programs, facilities design and so on.

According to Strange and Banning (2015), it is essential to develop multicultural competencies among students to achieve multiculturalism on campus and prepare students to work with a diverse college population. Multicultural competencies are a set of "awareness, knowledge, and skills needed to work with others who are culturally different from self" (Pope et al., 2004; Sue et al., 1982; Pedersen, 1988). "Both knowledge and awareness are needed to develop multicultural skills that enable one to behave effectively in a multicultural situation to bring about an effective change" (Pedersen, 1988, p.107). According to Pope et al. (2004), several studies have developed instruments to assess the multicultural competencies of teachers,

counselors, and student affair professionals, but there is a gap that exist in this area of measuring the multicultural competencies of students (Sheridan et al., 2002; Pope & Reynolds, 1997).

As multiculturalism and issues of sensitivity or insensitivity among minority or marginalized groups become more prominent, universities have developed various policies and programs (Cuyjet et al., 2016). Studies demonstrated the effect of university activities or initiatives on students' multiculturalism and multicultural competency development (Appel et al., 1996; Chang, 1999; Hurtado et al., 2002; Pascarella & Terenzini, 1991; Villalpando, 2002). For example, Astin (1993) identified that providing curricular and extracurricular opportunities to address multicultural issues are associated with "widespread beneficial effects on a student's cognitive and affective development."

Among experiences that influence students' behaviors at college, one of the essential things is the college's physical environment (Strange & Banning, 2015). The role of the physical environment has long been recognized by several theorists. Kurt Lewin (1936) proposed the formula $B = f(P, E)$ in his book titled "Principles of Topological Psychology" to explain that behavior (B) is a function (*f*) of the interaction of a person (P) and his or her environment (E). Later, Kaiser (1975) applied Lewin's model to college settings. Bronfenbrenner (1979), in his ecological model, also highlighted the influence of educational institution's environment which can be social or physical on human growth and development.

Physical environments on campus act as behavior settings i.e., provide nonverbal cues for behavior (Strange & Banning, 2015). Members of campus perceive these through their own cultural lenses, which can either align with the intentions of campus administrators or can be opposite that (Strange & Banning, 2015). For example, by providing hallways, walls, and sitting spaces, flow of pedestrians/space users is pretty much defined by decision makers. But

sometimes people use the space not intended by decision makers. They might rearrange the sitting spaces to meet their needs or use the hallways not originally designed for. This makes understanding students' perspective important while taking decisions about campus environment.

Design elements and *proxemics* of campus demonstrate these non-verbal messages of the college environment (Hormuth, 1990; Strange & Banning, 2015). *Proxemics* is "the study of the social implications of the use of physical space" (Strange & Banning, 2015), and *design elements* are objects made or modified by inhabitants that are often placed on campus with intended purposes (Banning & Bartels, 1997). These design elements which include art, signage, interior design, architecture, landscape design and graffiti store cultural meanings (Geertz, 1973) and can be used to study the material culture of a particular community or society. They also affect the behaviors of inhabitants and can be used to reflect the values of campus associated with multiculturalism (Banning & Bartels, 1997). For example, many campuses have flags of different countries in their international centers to make students coming from these countries feel represented and that they belong.

To examine the effect of the college environment on student outcomes, Astin (1993) proposed *Input-Environment-Output* (I-E-O) model. *Inputs* are personal characteristics students bring initially to an educational program*, environment* refers to students' actual experiences during an educational program, and *outcome* is qualities/competencies colleges are trying to develop in students through the initiatives or programs (Astin, 1993). According to I-E-O Model, both inputs and environment can directly affect outputs, and the environment can also mediate this relationship. This study examines the effects of a college's physical environment on students' multicultural competencies using a theoretical framework developed based on Astin's I-E-O model.

1.2 Statement of Problem

Design elements are objects made or modified by man (Prown, 1982) and "communicate powerful and important messages" (Hormuth, 1990). These include art, signs, graffiti, building design (architecture and interior design), and landscape architecture (Banning & Bartels, 1997). In a college environment, they act as nonverbal cues of college culture, especially the college's commitment to multiculturalism (Banning & Bartels, 1997; Strange & Banning, 2015). These elements affect the behavior and judgment of students, especially on their multicultural competencies (Banning & Bartels, 1997; Strange & Banings, 2015) however, very little guidance is available regarding their design (Devlin et al. 2009).

Although multicultural competencies are becoming an essential requirement for ethical and successful practice (Pope & Reynolds, 1997), there are very few studies focusing on the multicultural competencies of students (Sheridan, Sheridan, & Anderson, 2002; Pope & Reynolds, 1997) especially when they relate to campus design elements. Given that these elements affect students differently because of their cultural experiences and background (Strange & Banning, 2015), it is critical to examine the effect of campus design elements on students' multicultural competencies and how the campus design elements have different effects on students who are not part of a dominant cultural group (Strange & Banning, 2015).

1.3 Purpose and Specific Objectives of the study

The purpose of this study was twofold. They are: (1) to examine the relationship between campus design elements of higher educational institutions i.e., art, signage, interior design, architecture, landscape design, and graffiti, and the multicultural competencies of students, and (2) to identify and propose characteristics of campus design elements i.e., art, signage, interior design that could enhance students' multiculturalism and multicultural competencies in the

campus. The ultimate goal of the study is to propose design guidelines on the campus design elements of higher educational institutions that can enhance the multicultural competencies of students.

For the first purpose of this study, which aimed to examine the relationship between the campus design elements i.e., art, signage, interior design, architecture, landscape design, and graffiti, and students' multicultural competencies, this study conducted a quantitative research study based on Astin's Input Environment Output (I-E-O) model (1993) as a theoretical framework. The campus design elements explored in this study include art, signage, and building design (architecture and interior design), landscape architecture and graffiti. This study developed the specific research objectives to achieve the first purpose. They are:

1. To perform literature review about designed elements of campus, and their relationship to campus multiculturalism and multicultural competencies of students,
2. To establish a research framework using Astin's I-E-O Model to investigate the relationship between campus design elements (art, signage, interior design of buildings, architecture, and landscape design) and multicultural competencies of students, and
3. To conduct a survey of college students regarding their perceptions of environmental design elements and their multicultural competencies.

For the second purpose of the study, which aimed to explore the campus design that could enhance campus' multiculturalism and students' multicultural competencies, this study adopted qualitative research with the following objective:

1. To conduct a design charrette with college students and several other campus community members i.e., diversity experts, interior designers, construction management experts etc.

to redesign a space on campus and to collect characteristics of spaces on campus to enhance multiculturalism and multicultural competencies of students.

1.4 Research Questions and Hypotheses

This study developed following research questions and hypotheses using Astin's I-E-O Model as guiding framework to examine the relationship between campus design elements of higher educational institutions and the multicultural competencies of students.

Research Question: Are there significant relationships among student characteristics, their perception of campus design element, and their multicultural competencies?

H1: Student characteristics have a relationship with perception of campus design elements (i.e., art, signage, architecture, interior design, landscape design, and graffiti) to be supportive of diversity.

H1.1 Age of students has a relationship with the perception of campus design elements to be supportive of diversity.

H1.2 Gender of students has a relationship with the perception of campus design elements to be supportive of diversity.

H1.3 Ethnicity of students has a relationship with the perception of campus design elements to be supportive of diversity.

H1.4 Nationality of students has a relationship with their perception of campus design elements to be supportive of diversity.

H1.5 Student's interaction with diverse people on campus has a relationship with their perception of campus design elements to be supportive of diversity.

H1.6 Student's interaction with diverse people off campus has a relationship with their perception of campus design elements to be supportive of diversity.

H2: Student characteristics have a relationship with students' multicultural competencies

H2.1 Age of students has a relationship with their multicultural competency gains.

H2.2 Gender of students has a relationship with their multicultural competency gains.

H2.3 Ethnicity of students has a relationship with their multicultural competency gains.

H2.4 Nationality of students has a relationship with their multicultural competency gains.

H2.5 Student's interaction with diverse people on campus has a relationship with their multicultural competency gains.

H2.6 Student's interaction with diverse people off campus has a relationship with their multicultural competency gains.

H3: Student's perceived diversity support of campus design elements have a relationship with their multicultural competency gains.

H3.1 Student's perceived diversity support of campus art has a relationship with their multicultural competency gains.

H3.2 Student's perceived diversity support of campus signage has a relationship with their multicultural competency gains.

H3.3 Student's perceived diversity support of campus architecture has a relationship with their multicultural competency gains.

H3.4 Student's perceived diversity support of campus interior design has a relationship with their multicultural competency gains.

H3.5 Student's perceived diversity support of campus landscape design has a relationship with their multicultural competency gains.

H3.6 Student's perceived diversity support of graffiti on campus has a relationship with their multicultural competency gains.

1.5 Significance of the study

With population diversity increasing in the U.S., students are coming different cultural background to educational institutions in the country. This increase in diversity has led educational institutions to work towards multiculturalism on campuses. The goal of these campuses is to prepare students to work alongside a diverse population, both in campuses and after graduation by developing a set of competencies. These are called multicultural competencies (awareness, knowledge, and skills) that allow individuals to behave appropriately and effectively in a multicultural situation. Since literature discusses the relationship between college physical environment and multicultural competencies of students, this study aims to investigate this relationship. The study adopted Astin's I-E-O model which is one of the widely used college impact model but has been rarely used to examine the impact of the physical environment of college on student outcomes. Therefore, this study will contribute to the body of knowledge by testing Astin's I-E-O model to examine the relationship between campus physical environment and students' multicultural competencies.

The findings of this study will give college administrators and policymakers insights into the relationship between campus physical environment and multicultural competencies of students. In addition, the design characteristics of building design elements gathered by this study can act as a guiding framework for college officials and designers to take appropriate design decisions targeted towards enhancing multiculturalism on campus and, ultimately, students' multicultural competencies.

1.6 Organization of the Dissertation

This dissertation has seven chapters. Chapter 1 presents an introduction to research along with goals, objectives, hypotheses, and significance of the study. Literature review along with theory used in this study are presented in chapter 2. Chapter 3 presents the methodology for data collection and analysis adopted for this study including sampling, study area, and survey instrument. The analysis and findings of quantitative data is presented in chapter 4 and for qualitative data is presented in chapter 5. Chapter 6 contains discussion and implications of the study. Conclusion, future study and limitations are presented in chapter 7.

Chapter 2
Literature Review

This chapter begins with a discussion on changing trends in the U.S. population followed by multiculturalism in educational institutions, its importance and multicultural competencies among students. Physical design elements of campus are discussed after this. The next section of this chapter is about Astin's Input Environment Output (I-E-O) model, and previous studies about this model. Lastly, conceptual model is developed and presented along with the research process for the present study.

2.1 Trends in the U.S. Diversity

Educational institutions have been criticized for their lack of providing appropriate and effective services to the diverse student population on campus (Strange & Banning, 2015). The United States has been facing the largest influx of immigrants in recent years since the 1900s. In 2016, 45% of the residents of the United States were foreign-born, which was the largest number of foreign-born residents in any nation (U.S. Census Bureau, 2016). Figure 1 shows the increase in the number of immigrants in the United States.

With this increase in diversity in the U.S. population, diversity in the colleges is also increasing along with many international students coming to U.S. colleges for higher education. Figure 2 shows the number of international students coming to U.S. colleges each year. These changing trends in diversity have made educational institutions address goals related to diversity, multiculturalism, and student outcomes in their agenda. The idea is to make their students feel welcomed and comfortable on campuses and prepare students by making them culturally competent to work in a diverse society and workforce (King & Hamilton, 2003).

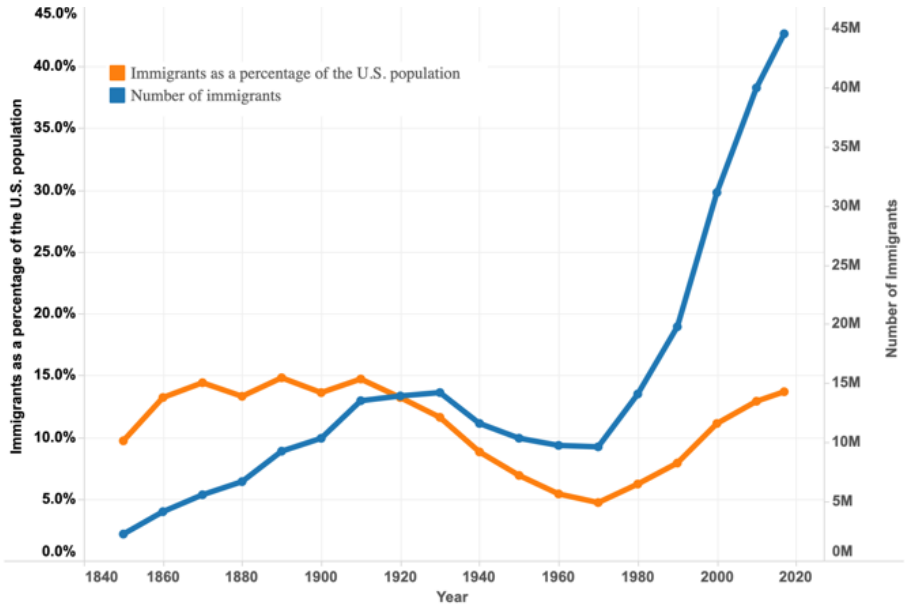

Figure 1 No. of immigrants, and their share of total U.S. population (1850-2017)

(Migration Policy Institute, 2019)

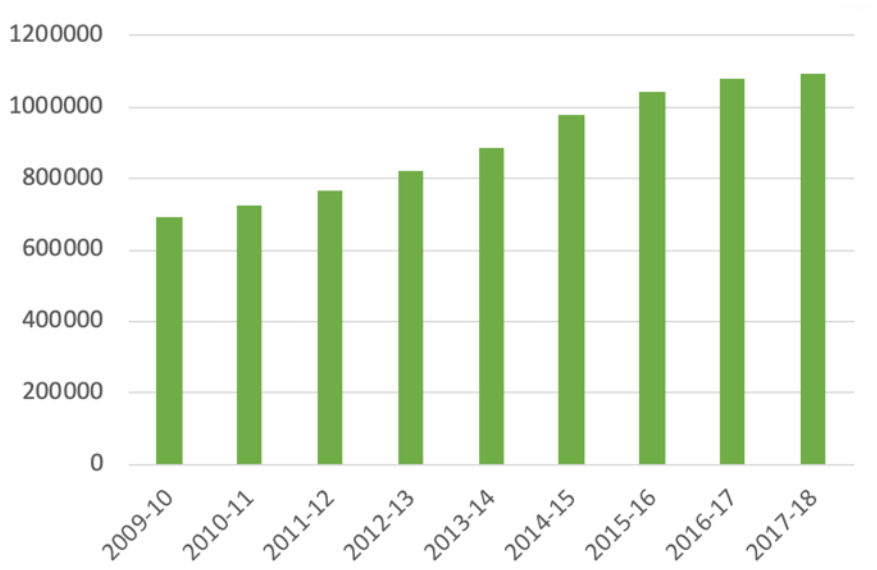

Figure 2 Number of International students admitted in the U.S. Colleges from 2009-2018 (Institute of International Education, 2018)

2.2 Multiculturalism

Multiculturalism arose in the late 20th century, and the term was first used in and applied to Canada. Multiculturalism has various definitions. Among other things, it is the coexistence of several cultural groups in a society wishing and, in principle, able to maintain their distinct identity. Multiculturalism is a term commonly used in scholarly and mainstream discourses today. Delgado and Stefancic (2012) defined multiculturalism as a perspective through which "social institutions should reflect many cultures" (p. 168). Reynolds (2004) suggested that multiculturalism is "about creating a new world where people, because of who they are (as differentiated from regardless of who they are) are welcomed and celebrated" (p. 104). Hall (2000) asserted that multiculturalism does not mean that a particular situation has already been achieved rather it refers to different strategies and policies that are used to manage diversity in a multicultural society.

Major and Mangope (2014) stated that multiculturalism attempts to "address issues of racism, sexism and discrimination against people with disabilities and minority groups." It includes acknowledging the diversity and individuality of members of the community and looking for ways (policies, initiatives, activities) to make them feel represented and accepted. According to Cuyjet et al. (2016) the practical reality of multiculturalism lies in the social and systematic structure of our society sending messages of recognition of the differences between diverse groups and understanding the biases could impede an individual's process.

The goal of multiculturalism in higher educational institutions is twofold (Major & Mangope, 2014). To educate minority groups about their history and culture and to teach them to be able to accept their identity and develop a positive self-concept. And to educate majority groups to develop an understanding and appreciation of minority groups and informs them about

the security and self-confidence they will experience by accepting minority groups. The goal of multiculturalism in educational institutions is to prepare students to work in harmony and develop multicultural competencies (Strange & Banning, 2015), which are qualities that enable one to work in a diverse setting with diverse participants (Pope et al., 2004).

2.2.1 Multicultural Competencies

Many higher educational institutions are trying to achieve diversity and multiculturalism. But since multiculturalism means different things to different people, there is a need to have an agreement on what competencies student needs to possess to become culturally competent in a diverse workforce (Howard-Hamilton, Richardson, & Shuford, 1998). Pope and Reynold (1997) developed a set of multicultural competencies, and their concept of multicultural competencies consists of three components: awareness, knowledge, and skills. King and Howard-Hamilton (2003) have used multicultural competencies introduced by Pope and Reynolds (1997) to assess the multicultural competencies of student affairs professionals and graduate students in their study. Researchers have defined multicultural competence as:

1. Multicultural Awareness: Awareness of both, own and other's cultural background along with the knowledge of how they interact to shape values, beliefs, and biases (Smith et al., 2011).
2. Multicultural Knowledge: Knowing the culture and cultural background of both, oneself and others (Smith et al., 2011).
3. Multicultural Skills: Skills required to work efficiently and successfully with diverse groups (Arredondo et al., 1996; Sue et al., 1982).

Multicultural competence is an intra-and-interpersonal process, often identified as developmental in nature (Arredondo et al., 1996), and is a never-ending process that requires

learning and re-learning (Pedersen, 1988). Multicultural awareness is the first step to develop multicultural competencies. Individuals should begin with exploring their biases, values, assumptions, and attitudes about their culture and other cultures (Pope & Reynold, 1997). The cultural identity of an individual includes age, gender, gender identity, race, ethnicity, culture, national origin, religion, sexual orientation, disability, language, or socioeconomic status (American Psychological Association, 2003). To proceed further in this development, individuals must correct their information about other cultures, their biases, and inaccurate or incomplete knowledge (Pope & Reynold, 1997). Arredondo and colleagues (1996) identified that specifically, one must be aware of the life experiences, cultural heritage, and historical backgrounds of culturally different individuals. Both awareness and knowledge are required for multicultural skills that enable one to work with diverse and multicultural individuals (Pope & Reynold, 1997). Table 1 presents 33 multicultural competencies based on awareness, knowledge, and skills developed by Pope and Reynold (1997).

Table 1 Multicultural Competencies (Awareness, Knowledge and Skills)

Awareness	Knowledge	Skills
A belief that differences are valuable and that learning about others who are culturally different is necessary and rewarding	Knowledge of diverse cultures and oppressed groups (that is, history, traditions, values, customs, resources, issues)	Ability to identify and openly discuss cultural differences and issues
A willingness to take risks and see them as necessary and important for personal growth	Information about how change occurs for individual values and behaviors	Ability to assess the impact cultural differences on communication and effectively communicate across those differences
A personal commitment to justice, social change, and combating oppression	Knowledge about the ways that cultural differences affect verbal and nonverbal communication	Capability to empathize and genuinely connect with individuals who are culturally different from themselves

Table 1 (cont'd)

Awareness	**Knowledge**	**Skills**
A belief in the value and significance of their own cultural heritage and worldview as a starting place for understanding others who are culturally different from them	Knowledge about how class, race and ethnicity, language, nationality, sexual orientation, age, religion or spirituality, disability, and ability affect individuals and their experiences	Ability to incorporate new learning and prior learning in new situations
A willingness to self-examine, and when necessary, challenge and change, their own values, worldview, assumptions, and biases	Information about culturally appropriate resources and how to make referrals	Ability to gain the trust and respect of individuals who are culturally different from themselves
An openness to and belief that change is necessary and positive	Information about the nature of institutional oppression and power	Capability to assess their own multicultural skills, comfort level, growth, and development
An acceptance of other worldviews and willingness to acknowledge that they, as individuals, do not have all the answers	Knowledge about identity development models and acculturation for members of oppressed groups and its impact on individuals, groups, intergroup relations, and society	Ability to differentiate between individual differences, cultural differences, and universal similarities.
A belief that cultural differences do not have to interfere with effective communication and meaningful relationships	Knowledge about within group differences and understanding of multiple identities and oppressions	Ability to challenge and support individuals' systems around oppression issues in a manner that optimizes multicultural interventions
Awareness of their own cultural heritage and how it affects their worldview, values, and assumptions	Information and understanding of internalized oppression and its impact on identity and self-esteem	Ability to make individual, group, and institutional multicultural interventions
Awareness of their own behavior and its impact on others	Knowledge about institutional barriers which limit access to and success in higher education for members of oppressed groups	Ability to use cultural knowledge and sensitivity to make more culturally sensitive and appropriate interventions
Awareness of the interpersonal process that occurs within a multicultural dyad	Knowledge about systems theories and how systems change	

Source: Pope and Reynolds (1997)

Several studies have highlighted the effect of multiculturalism in college environment on various student outcomes (Appel et al., 1996; Chang, 1999; Hurtado et al., 2002; Pascarella & Terenzini, 1991; Villalpando, 2002). Using competencies developed by Pope and Reynolds (1997), Cheng and Zhao (2006) studied the relationship between students' multicultural

competencies and active participation in college. They found that involvement in student organizations led to their gain in multicultural competencies. Similarly, Smith et al. (2011) studied the relationship between multicultural service-learning and self-reported multicultural competencies in undergraduate students. They found an increase in student awareness about their culture, privileges they hold, and the cultural background of others.

student awareness about their culture, privileges they hold, and culture background of others.

To prepare multicultural competencies among students, educational institutions take several initiatives, including dialogues, research, curriculum design, and so on. In addition to these, the physical environment of educational institutions also affects students' multicultural competencies because the environment is experienced differently by different students based on their culture and cultural background (Strange & Banning, 2015). Therefore, it is critical to examine the effects of a college's physical environment on students and assess how same environment might be perceived differently by different students (Strange & Banning, 2015).

2.3 Physical Environment of Universities

The Environment affects the individuals who use that environment as Kurt Lewin (1936) proposed the formula B = *f* (P, E) to explain that behavior (B) is a function (*f*) of the interaction of a person (P) and his or her environment (E). Later, Kaiser (1975) applied Lewin's model to the college setting. The impact of the college's physical environment on student behavior includes the concept of architectural determinism, architectural probabilism, and architectural possibilism. The physical environment of an educational institution act as a behavior setting and is composed of two aspects: physical, or nonhuman, aspects and the social, or human, aspects. Humans interact on campus within non-human aspects (e.g., buildings, pathways, etc.), that influence their behaviors, which can vary based on cultural backgrounds (Strange & Banning,

2015). These non-verbal influences can be manifested through physical artifacts (Strange & Banning, 2015) which are communicators of campus environment (Banning & Bartels, 1997).

Physical environment of college is therefore categorized into 'proxemics' and 'physical artifacts' (Strange & Banning, 2015). Proxemics is "the study of social implications of the use of physical space" (Strange & Banning, 2015, p.43) and physical artefacts are objects made or modified by inhabitants that are often placed on campus with intended purposes (Banning & Bartels, 1997). These store cultural meanings (Geertz, 1973), affect the behaviors of inhabitants and are used to reflect the values of campus associated with multiculturalism (Banning & Bartels, 1997). According to Banning and Bartels (1997), physical artifacts include arts, signage, graffiti, and architecture. However, the physical artifact is a very broad term used differently by different authors. For example, Davis (1984) categorized artifacts into three types: physical structure (e.g., space, location, arrangement), physical stimuli (e.g., noise, reading material, incoming mail) and symbolic artifacts (e.g., signs, colours, carpets, furniture). Also, since physical artifacts can include anything made or modified by men, according to Banning and Bartels (1997), there can be so many things that can be counted as physical artifacts. To avoid this confusion, the term "physical design elements" will be used instead of "physical artifacts" in this study. The physical design elements on campus are categorized into six categories (Banning & Bartels, 1997).

Art: Art includes paintings, posters (drawings, and prints (Prawn, 1982)) placed in campus buildings, statuary found within the campus landscape (Banning & Bartels, 1997), and photographs (Prawn, 1982).

Graffiti: Banning, and Bartels (1997) explained graffiti as "illegitimate signs". These are defined by Encyclopedia Britannica as "incised inscriptions". It is derived from the Italian verb

‘‘graphere’’ (to write) and has been used as a generic term for any writings or scratching upon a surface (Daniell, 2011).

Signs: These fall into several categories, including official signs, unofficial signs, and illegitimate signs (Zeisel, 1975).

Building Design including Architecture and Interior Design: Banning and Bartels (1997) discussed only architecture as the fourth design element that represent multiculturalism on campus and have an effect on multicultural competencies of students. But building design include both architecture and interior design. Historically, architecture was a created solely as a shelter to protect human beings from harsh weather and wild surroundings. Gradually, it evolved and instead of creating a structure that would act as a shelter, the design of the exterior and interior space also gained equal importance. As Vitruvius discussed three prerequisites for designers to consider when designing a building or creating a physical structure as *Firmitas* (strength), *Utilitas* (functionality) and *Venustas* (beauty). Therefore, in addition to structural elements that constitute an architecture, interior design has also become equally important and require its own separate category.

They defined architecture as “the physical structures within educational building.” (Banning & Bartels, 1997). Later Cuyjet (2011) defined architecture as modifications to landscape, such as specific physical structures designed and built on campus with intended purpose (Cuyjet, 2011). Architecture has various elements that create a building such as columns, floor, wall, ceiling, roof, door, window, facade, balcony, corridor, stair, escalator, elevator and ramp etc. (Koolhaas, Westcott, & Petermann, 2014),

Interior design is defined as the "…analysis, planning, designing, documentation, and management of interior non-structural/non-seismic construction." (CIDQ). The primary element of interior design is hollow forms, rooms or other spaces within a building (Pile, 1998).

Landscape Architecture: Another category of campus design that emerged from the examples discussed by different authors (Strange & Banning, 2015; Banning & Bartels, 1997) is landscape architecture. Landscape architecture is defined as the art or the science "… of arranging land, together with the spaces and objects upon it, for safe, efficient, healthful, pleasant human use." (Newton, 1971). The elements of Landscape architecture are "landform, plant material, buildings, pavements, site structure (steps, ramps, walks etc.), and water." (Booth, 1989).

All these fields i.e., architecture, interior design, and landscape architecture revolve around two components which are functionality and design (Berezin & Gonzalez, 2012). In addition to functionality, the other components or qualities of architecture and interior design are form, texture, color, pattern, view/outlook and light (Ching, 2014; Nagpal, 2015; Pile, 1998). Similarly, Landscape architecture also has some components which are color, form and texture (Holden & Liversedge, 2014).

It is these components of environmental design that creates a visual impression in an observer invoking a corresponding emotional reaction in him (Nagpal, 2015). The explanation of these qualities of architectural space are shared in Table 2.

Table 2 Components of Architecture, Interior Design and Landscape Architecture

Qualities of Space	Explanation
Form	The shape and structure of something as distinguished from its substance and material. In other words, a physical form of anything that is three dimensional.
Color	The phenomenon of light and visual perception that may be described in terms of an individual's perception of hue, saturation, and tonal value. Color is the attribute that most distinguishes form from its environment. It also affects the visual weight of a form.
Texture/ Pattern	The visual or tactile quality given to a surface by the size, shape, arrangement, and proportions of parts. Texture also determines the degree to which the surface of a form reflect or absorb incident light.
View/ Outlook	the focus and orientation of the space. Some spaces can have internal focus such as a fireplace etc. while others can have outward orientation by views to outdoors or adjacent space. Windows, skylights, openings etc are used to create this outlook.
Light	The illumination of a surfaces and forms. It can be both natural or man-made light.
Functionality	Ease and convenience of the user (Fabisiak et al, 2014)

Adopted from Ching, 2014

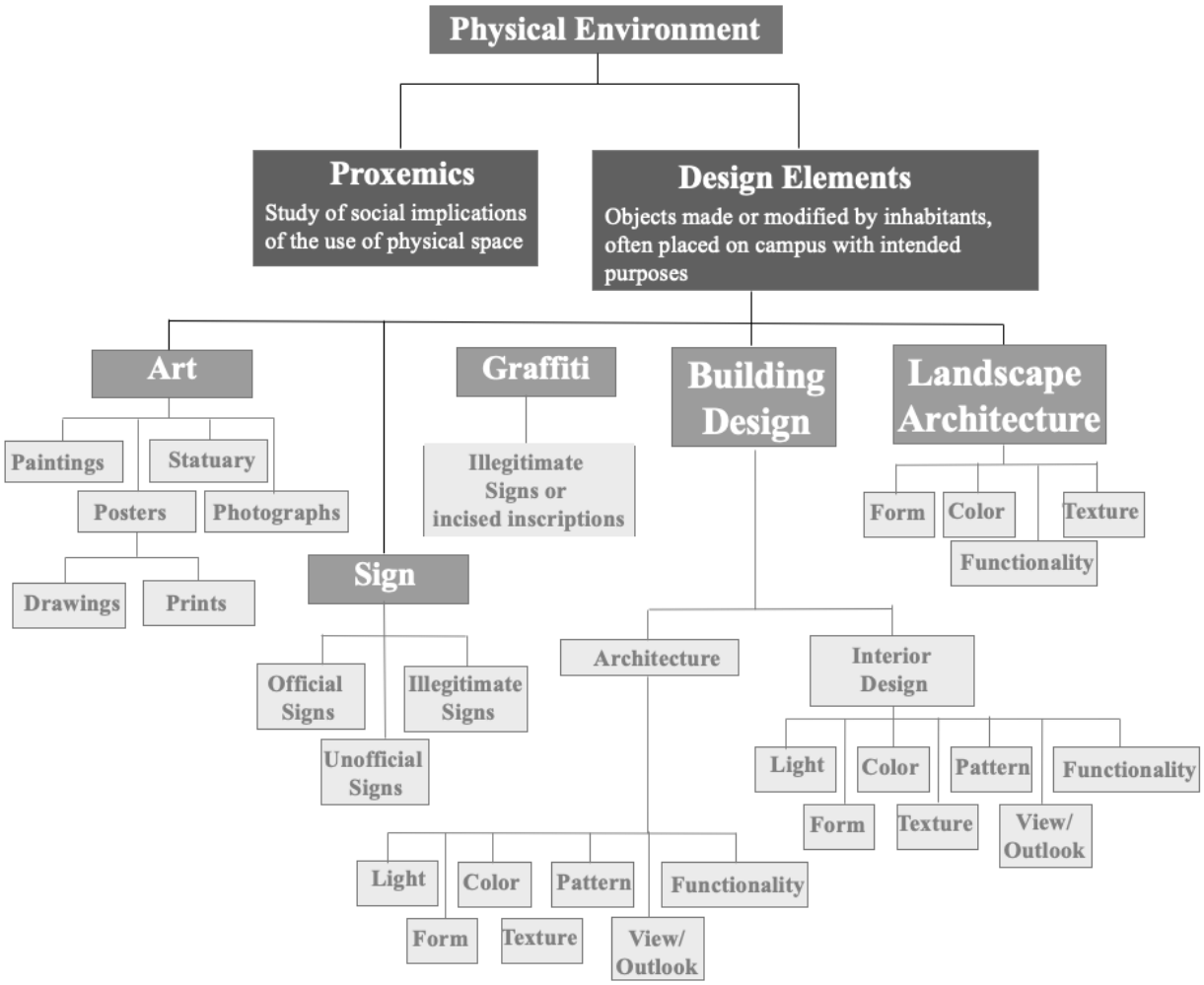

Figure 3 Physical Artifacts of College Campus that effect Multicultural Competencies of Students

2.3.1 Previous Studies about Physical environment and its effect on competencies

There is an "important link between function and symbol in the physical environment [which] is nonverbal communication" (Strange & Banning, 2001, p. 16). This communication between physical environment and the observer takes place through cultural lens of the observer and can therefore have varied effects on the observer (Strange & Banning, 2015). Different campus artifacts have been discussed in literature that can affect student competencies and

learning. For example, Molderez and Ceulemans (2018) used art as a way to develop system thinking among students and to help them understand different ways of thinking (top down and bottom up) about sustainability. In this study they used paintings to achieve this and found out that art helped students learn and understand these concepts. Similarly, Ernst et al. (2016) also explored the role of museums to change perspectives and learning of people through art. Since art trigger's people's emotions and helps them look beyond the text (Molderez & Ceulemans, 2018), Dutrov (2007) found that students preferred visuals as a learning style. In another study Martzog et al. (2016) studied the role of art to facilitate the development of competencies such as empathy and tolerance of ambiguity. The did a quasi-experimental study and compared two groups of teacher training programs. In one group participants engaged with art as part of learning and in the other they did not. The findings suggested that engagement with art increased both, the emotional and cognitive dimensions of participants.

As discussed above, architecture, interior design and landscape architecture also facilitate the learning and competency development. Functionality is the most important aspect of any facility and is defined as the ease and convenience of the user (Fabisiak et al, 2014). The core idea is that the design should be accessible to all users irrespective of their physical abilities. It is found to have an effect on their well-being and life satisfaction of users if the design does not meet their physical needs or is not fully functional (Fänge et al., 2002). Functionality or accessibility of designs has been explored a lot through research and there are several laws that have been developed to meet physical needs of people through design such as, American with disability act (ADA) in the U.S.

Color preference of people and their responses to colors vary based on their culture (Fehrman & Fehrman, 2000; Chebat & Morrin, 2007). For example, as Kwalleek & Lewis

(1990) found red color to be having most arousal effect on user and also less mistakes made by them while Kamaruzzaman and Zwawi (2010) found blue color to be having these effects on users. These studies suggest that effects of colors vary based on culture and preference as different colors have different meaning in different cultures and highlight the need of more studies to explore the effect of color on different people (Jalil et al., 2012).

Similarly, Tanner and Langford (2002) found the effect of textures on student learning. They found that in carpeted classrooms students had higher achievement scores than those attending schools with hard surfaced classrooms. Another study found that adding plants in classroom resulted in higher comfort and friendliness of students as compared to students without plants (Han, 2009). Rodemann (199) also classified patterns into different categories such as florals, botanical and natural, geometric, stripes, graphic mini print and small design, symbols and medallions, stylized overall continuous designs, abstract/ contemporary, natural textures/faux effects, material/ textile effects, pictorial novelty and scenic, documentary/ historic/ architectural/ cultural, and combination design category. He also discussed these patterns in walls, floor, ceiling, upholstery, bedding, table wear, cabinetry etc.

Providing views with the help of windows and skylight have also been linked to higher progress rate. For example, a study done by Heschong Mahone Group (1999) found a 15 percent faster progress in mathematics and 23 percent faster progress in reading among students in classroom with larger windows as compared to the ones in classroom with smaller windows. Uline and Tanner (2009) also found that providing views in classrooms significantly influenced the variance of Reading vocabulary, Language arts, and Mathematics of students.

Building shape and form create emotions in people and these emotions influence the way people react, affiliate, approach and avoid their near environments (Madani Nejad, 2007).

Madani Nejad (2007) compared curvilinear and rectilinear forms of furniture in interior setting and found that people found curvilinear lines more welcoming and pleasant. Since curvilinear lines created positive emotion, people approached those settings more.

2.3.2 Design Elements in this Study

The review of previous literature that examined the relationship between design elements on multicultural competencies of students show that there is an effect of these elements on behaviors and competencies of people. But the effect specifically on multicultural competencies has not been examined yet. Therefore, this study aims to fill this gap and examine the relationship between campus design elements (i.e., art, signage, architecture, interior design, landscape architecture and graffiti) on multicultural competencies of students. To examine this relationship Astin's Input Environment Output model was used as a theoretical foundation.

2.4 Astin's Input-Environment-Output Model

Lewin (1936) proposed a formula $B = f(P, E)$ to explain that behavior (B) is a function (f) of the interaction of a person (P) and his or her environment (E). Later, Kaiser (1975) applied Lewin's concept to the college setting and identified this interaction as a "transactional relationship" in which "the students shape the environment and are shaped by it" (p. 38). So many theories and models have been presented since then to explore this interaction between students and college environment. College unions, campus planners and architects, and firms that specialize in working with higher education embrace the impact of the physical facilities on the experience of college students in the United States (Barrett, 2014). They have embraced two concepts that have their origins in environmental psychology to relate the transactional relationship between the physical environment and the students who occupy it. These two concepts are called architectural possibilism and architectural probabilism (Strange & Banning,

2001; Porteous, 1977; Moos, 1976). Architectural Possibilism suggests that "...all physical features have an equal chance of attracting user interest and affecting their experience" (Rullman et al., 2012, p.11), and architectural probabilism takes the possibilities and makes them more probable – the probability of a response can be impacted by design (Rullman et al., 2012). Architects and planners that specialize in the design of college facilities use these concepts and believe their work positively impact the students (Barrett, 2014).

Alexander Astin proposed Input Environment Outcome (I-E-O) Model (Astin, 1993) which has been one of most enduring and influential models that assists researchers and practitioners in examining the factors influencing student outcomes (Ozaki, 2016). This model was developed specifically for examining the influence of student's post-secondary experiences on their growth or learning. Figure 4 shows the path diagram of Astin's I-E-O Model with three constructs or variables.

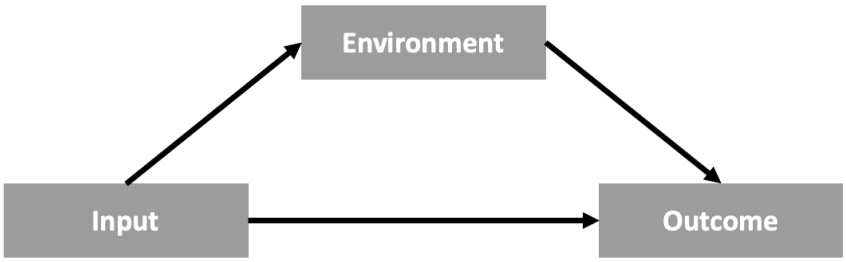

Figure 4 Astin's I-E-O Model (Astin, 1993)

The **Inputs** in I-E-O Model "includes a wide variety of personal, family, and educational background characteristics that students bring with them to their postsecondary experience. These traits include such things as academic and intellectual abilities, precollege achievements (academic and otherwise), goals and motivation levels, degree and career aspirations, and a range of demographic, personal, and family characteristics, such as gender, race/ethnicity,

socioeconomic status, age, marital status, and citizenship. "Inputs" also refers to a variety of other obligations students may have, including those to family and/or work." (Terenzini, 1997).

The **Environment** refers to students' actual experiences during an educational program that might affect the learning or changes that happens in a student. There could be four identifiable sources of influence at colleges i.e., curricular experience, formal institutional experience, ou-of-class experience, and institutional experience (Terenzini, 1997). These are shared in Figure 5.

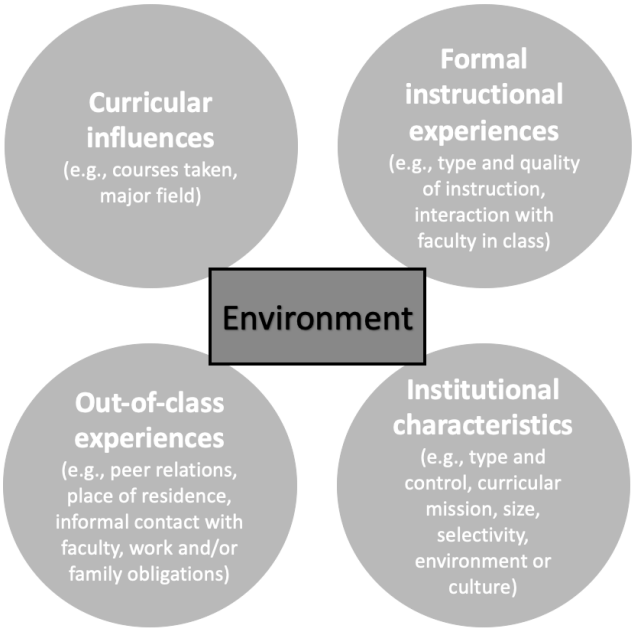

Figure 5 Four sources of Environmental influence (Terenzini, 1997)

The **Outcomes** in the model are the talents of students, the changes they develop or the effects of attending post-secondary educational institution (Terenzini, 1997).

Astin's I-E-O Model represents that outcome in terms of student development are determined by both inputs and learning environments; at the same time inputs also influence outcomes. The model also suggests that the environment could function as a mediator. Moreover,

Astin (1993) explained that the relationship between environment and student outcomes cannot be understood without taking into account student inputs. Rather than a theoretical model focused on explaining change, I-E-O has served more as a conceptual or methodological guide or framework (Pascarella & Terenzini, 2005). This model has been selected for the present study because it allows to examine the effect of college experiences i.e., physical design elements on student outcomes i.e., multicultural competencies, which is the intent of this study.

Astin proposed that student learning which is the output in Astin's I-E-O model depend on their level of involvement in college activities (1984,1991). He proposed this in his 'theory of involvement' and highlighted that student's level of learning depends on their quality and quantity of involvement (1984). Different studies have included this in their surveys for example, Cheng and Zhao (2006) found a link between the time spent by students in college activities and their multicultural gains.

2.4.1 Previous studies using Astin's I-E-O Model:

Astin's I-E-O Model has been used by several studies to examine the influence of different college policies and programs on student outcomes. Table 3 shows some of the studies that utilized this model. Using Astin's I-E-O model as foundation, these studies had various inputs, environmental factors and outputs, and examined the relationship between these three variables. The results of each study are also shared below including the methodology followed by each study.

Table 3 Previous studies using Astin's I-E-O Model

Reference	Input	Environment	Output	Result	Methodology
Norwani, Yusof, & Abdullah, (2009).	Students' gender, race, entry qualification, career aspiration, parental occupation and grades in subjects at the Malaysian Certificate of Education level.	Academic facilities, course content, teaching-learning, interaction with lecturers and friends, cocurricular, academic effort and instrumental tactics	Cumulative grade point average (CGPA) and development in competencies such as creative-critical thinking, communication and group work	Students' input were the biggest predictors for CGPA while environmental factors were the biggest predictors for competency development	Four higher educational institutions were randomly selected from a group of nine institutions. The data was then collected from final year students majoring in business discipline.
Yanto, Mula, & Kavanagh, (2011)	Student Motivation (SM), Student Previous Achievement (SPA), Student Demographic Characteristics, Learning Facilities (LF), and Comfort of Class Size (CCS)	Student Engagement (SE)	Students' Accounting Competencies (SAC)	The results show that SM, SPA, CCS, and LF significantly affect SE and at the same time SE also influences SAC.	Universities were randomly selected in Indonesia based on accreditation level and location. Then students were recruited from sampled eight universities for the study.
Cheng & Zhao. (2006)	Student characteristics i.e., class level, GPA, gender, ethnicity, U.S. citizenship, and family income.	The level of undergraduate's participation in selected college organizations and activities	Multicultural competence development	1) Among different types of activities, participating in cultural organizations, social action groups, student government, and volunteer/community service groups seems to have led directly to student gains in multicultural competence. 2)students' perception of campus environment being diversity friendly is most positively associated with their self-perceived gains in multicultural competence. 3) student characteristics do not have a statistically significant indirect effect on their multicultural competence gains.	Data was collected from undergraduate students through a web-based survey at a private residential college within a large research university in an urban area.

Table 3 (cont'd)

Reference	Input	Environment	Output	Result	Methodology
Thurmond, Veronica A., et al. (2002)	These questions addressed perception of computer skills, knowledge of electronic communications technology, number of Web courses taken, age, and distance from main campus	Questions about comparison between web-based environments and in person learning environment.	Student's satisfaction with the course	Student characteristics did not influence the Web-based environment—and consequently did not influence the outcome of student satisfaction. The selected environmental factors were highly predictive of whether or not students were satisfied with a Web-based course.	Data was collected from students of seven online nursing courses in three midwestern universities using online platform.

These are some of the studies which utilized Astin's I-E-O Model to examine the effects of different college initiatives and policies on intended student outcomes. They used various student inputs and outputs based on their objectives.

2.5 Conceptual Framework

The following research questions were examined in this study:

1) Is there a relationship between design elements of campus and multicultural competencies of students?
2) What should be the characteristics of campus design elements that could enhance multiculturalism on campus and multicultural competencies of students?

To examine the relationship between design elements of campus and multicultural competencies of students, Astin's I-E-O model had been adopted. According to Astin's I-E-O model, the environment students experience at a higher education institution, impacts their learning outcomes. Using this framework, Cheng and Zhao (2006) found a positive relationship between students' participation in college organizations and activities, and their multicultural

competencies. Similarly, Yanto et al. (2011) found an impact of learning facilities on students' accounting competencies. Therefore, a conceptual framework for the study was developed using Astin's I-E-O model and is shown in Figure 6. To answer the research questions and test the hypotheses of this study, a research process was conceptually developed as presented in Figure 7.

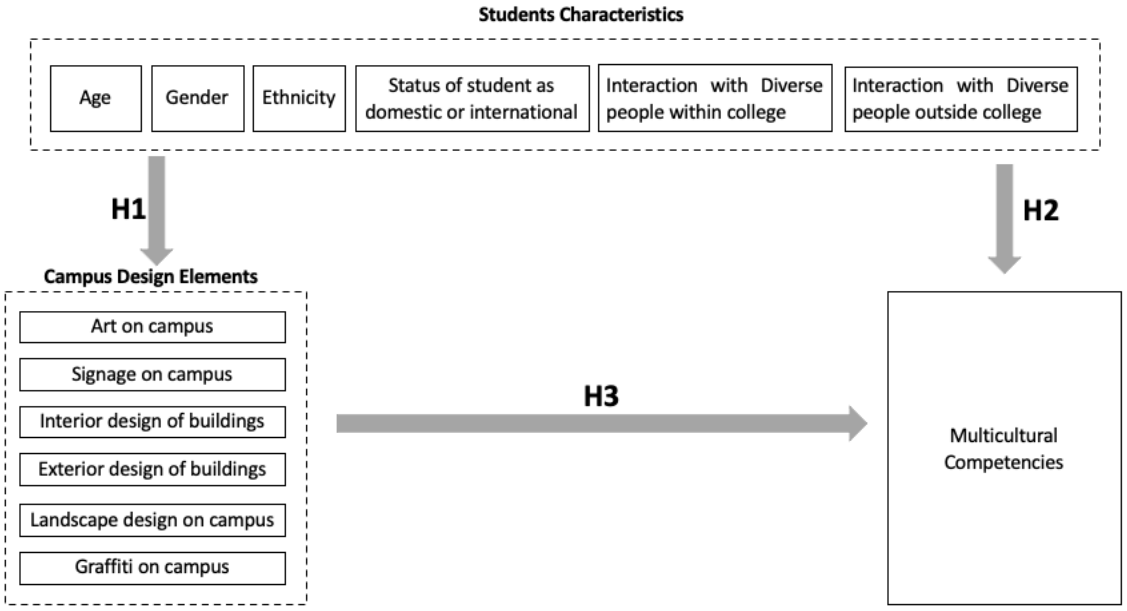

Figure 6 Conceptual Frame

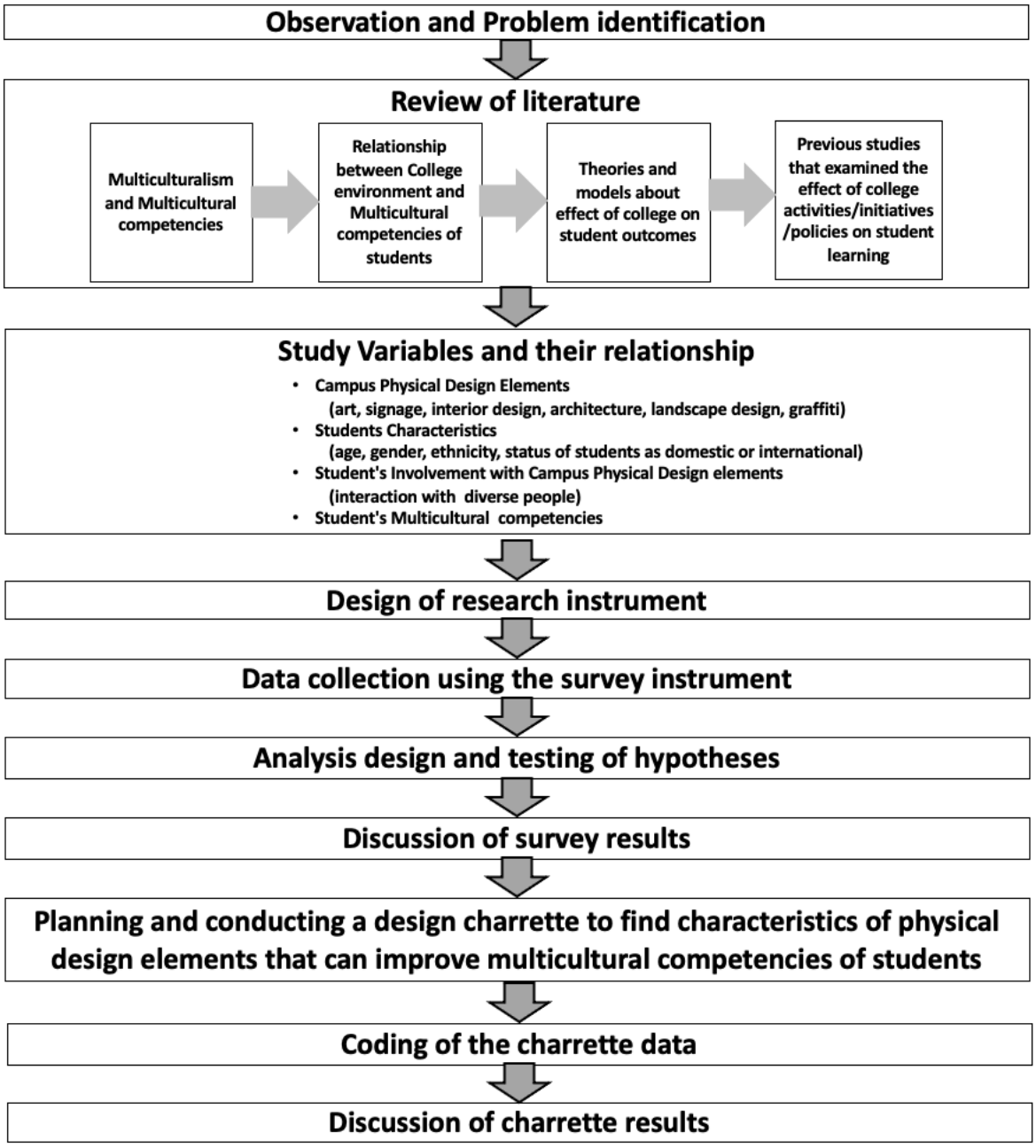

Figure 7 Research Process

Chapter 3
Research Methodology

3.1 Research Design

The purpose of this study is (1) to examine the relationship between campus design elements of higher educational institutions (i.e., arts, signage, interior design, architecture, landscape architecture, and graffiti) and the multicultural competencies of students, and (2) to explore the characteristics of design elements that could enhance multicultural competencies of students. To meet these objectives, the study used the sequential explanatory mixed method design. In the first phase, quantitative research was conducted using a survey method among students from a midwestern college campus. In the second phase of the study, qualitative research was conducted by completing a design charrette to explore the characteristics of campus design elements that can improve multiculturalism on campus and enhance the multicultural competencies of students. **Error! Reference source not found.** shows the data collection and a nalysis plan of this study.

3.2 Phase I: Quantitative Methodology

A survey was used to collect data in the first phase of the study to examine the relationship between campus design elements and the multicultural competencies of students.

3.2.1 Study Area

Michigan State University (MSU), located in the mid-western part of the U.S., was selected as the study area. It has a diversity index of 0.41, according to the U.S. News (https://www.usnews.com) which calculated the diversity index from the data drawn from each institution's fall 2019 total undergraduate student body. The ethnic categories used in the calculations were non-Hispanic African American, Hispanic, American Indian, Pacific

Islander/Native Hawaiian, Asian, non-Hispanic whites, and multiracial (two or more races). Students who did not identify themselves as members of any of those demographic groups were classified as non-Hispanic whites for the purpose of these calculations. The formula produces a diversity index that ranges from 0 to 1. The closer a school's number is to 1, the more diverse the student population.

It houses various types of buildings (i.e., residential, educational, recreational, etc.), providing students various opportunities to experience different buildings on campus. According to MSU Infrastructure Planning and Facilities (MSU-IPF), MSU has a total of 562 buildings, out of which 106 are located on campus.

3.2.2 Participants and Sampling

Unit of Analysis

The unit of analysis in this study was the students at MSU. MSU has a diverse student population (i.e., diversity in gender, age, nationality, school year, years spent in the U.S., ethnicity, and so on). Table 4 shows the percentage of the diverse student population on campus.

Table 4 Student Diversity Information of MSU

African American/Black	7.9%
American Indian/Alaska Native	0.3%
Asian	6.8%
Hawaiian/Pacific Islander	0.1%
Hispanic/Latino/a (of any race)	5.7%
Two or More Races	3.5%
Total Students of Color	**24.2%**
White	74.4%
Other/Unknown/No Response	1.4%
Domestic Total	**88.6%**
International	11.4%
University Total	**100.0%**
Men	48.0%
Women	52.0%

Copied from MSU Annual Report on Diversity and Inclusion

Target Population

The target population for this study was both undergraduate and graduate students at MSU. Since diversity among students was important, the study collected data from all students irrespective of their ethnicity, age, gender, etc., except for the limitation mentioned earlier.

Sample size

The sample in the study should represent the population the sample is taken from. If not done properly, this could affect the internal and external validity of the study (Creswell 2014).

Determine population size: The population for this study is students at MSU. PSU (2014) recommended if the population size is small (<200), it's better to add everyone in the sample to avoid sampling error. As the population of MSU is more than 200, following the advice of Creswell (2014), systematic random sampling was used in this study. MSU registrar office was contacted to send out emails regarding the survey to MSU students as they have access to almost every MSU student email address. The target sample size was shared with them and based on that, they sent out emails to every nth number of students on their list.

Estimate the sample size: MSU has a large student population (i.e., 49,809 in 2021) Using the table provided by Gill et al. (2010) sample size for this study was calculated. At a confidence level of 95%, a margin of error ±5% and population size of 49,809, the sample size came out to 379. Nulty (2008) found the response rate of online surveys to be 33%. However, the committee recommended to send out survey to as many students as possible. Since it was an online data collection, the researcher was able to reach 10,000 students with the assistance of university platform. 2975 complete responses were collected which was response rate of 29.75%.

3.2.3 Survey Instrument Design

This study adopted Astin's I-E-O model as a theoretical foundation, so previous studies that used this model were reviewed for the survey instrument design as shown in Table 3. Based on Cheng and Zhao (2003) who examined the effect of the college social environment on the multicultural gains of students, this study developed a questionnaire to examine the relationship between students' perceptions of campus design elements and multicultural competencies. The survey tool for this study consisted of three sections.

Section I asked questions about students' perceived diversity support of six campus design elements (i.e., arts, signage, interior design, architecture, landscape architecture, and graffiti). The respondents were asked to rate the level of diversity-support for six campus design elements using four questions. Five-point Likert scale was used with 1= strongly disagree and 5= strongly agree. Table 5 shows four questions in the first column and six campus design elements in the second column. The detailed survey instrument is included in Appendix A.

Table 5 Questions about Perception of Campus Physical Environment

Campus Perception Questions	Sub sections for each perception question
1. The MSU campus represents diverse cultures through: 2. The MSU campus encourages positive understanding among different cultural communities through: 3. My ability to understand people of different cultural groups has improved because of my experience with the following aspects of MSU campus. 4. The MSU campus environment helps me explore issues of diversity through:	I. Art such as painting, poster, photograph, statuary II. Signage including official, unofficial, and illegitimate signs III. The architectural design of buildings IV. The interior design of buildings V. The landscape on campus VI. The graffiti (chalked, scratched, scribbled, or sprayed) across campus

In this section, respondents were also asked about their frequency of visits to three buildings on the MSU campus, including the MSU Main Library, Union building, and

International Center (see Appendix A). This question was asked to find the building most frequently visited by the majority of students for phase II of the study.

Section II of the survey instrument measured the multicultural competencies of students. The respondents were asked to self-assess their multicultural awareness, multicultural knowledge, and multicultural skills. Based on the multicultural competencies developed by Pope and Renold (1997) as shown in Table 1 , D'Andrea, Daniels, and Heck (2002) developed a multicultural awareness, knowledge, and skills survey (MAKSS), which has been used by various studies. The MAKSS was originally designed to examine the multicultural competencies of counselors, so several measures of the survey were adapted to assess multicultural competencies of students. Table 6 shows questions measuring multicultural competencies of students.

Table 6 Questions about Multicultural Competencies

Questions about multicultural competencies	Scale
At this time in your life, how would you rate yourself in terms of understanding how your cultural background has influenced the way you think and act? At this point in your life, how would you rate your understanding of the impact of the way you think and act when interacting with persons of different cultural backgrounds? At the present time, how would you generally rate yourself in terms of being able to accurately compare your own cultural perspective with that of a person from another culture?	o Very limited o Limited o Good o very good o Very limited o Limited o Good o very good o Very limited o Limited o Good o very good
Ambiguity and stress often result from multicultural situations because people are not sure what to expect from each other.	Strongly disagree o Disagree o Agree o Strongly agree

Table 6 (cont'd)

Questions about multicultural competencies	Scale
At the present time, how would you rate your own understanding of the following terms: o Culture o Ethnicity o Racism o Prejudice	o Very limited o Limited o Good o Very good
How would you rate your ability to communicate with a person from a cultural background significantly different from your own?	o Very limited o Limited o Good o Very good
In general, how would you rate yourself in terms of being able to effectively deal with biases, discrimination, and prejudices directed at you.	o Very limited o Limited o Good o Very good
How well would you rate your ability to accurately identify culturally biased assumptions?	o Very limited o Limited o Good o Very good

Section III contained questions related to student characteristics/ demographic questions. Following the suggestions of Dillman, Smyth, and Christian (2009), demographic information which is considered sensitive was asked in the last section. Table 7 shows the demographic and interaction questions.

Table 7 Demographic and Involvement Questions

Inputs	Questions		Reference
Age	Your age o Less than 20 years old o 21-25 years o 26-30 years o 31-35 years	o 36-40 years o 41-45 years o 46-50 years o More than 50 years	Cheg & Zhao (2006); Strayhorn (2008); Yanto, Mula, & Kavanagh, (2011)

Table 7 (cont'd)

Inputs	Questions	Reference
Gender	Your Gender o Male o Female o Transgender female o Transgender male o Gender variant/non confirming o Other: Please specify if selected other: _____ o Prefer not to answer	Kinzie et al, (2007); Cheg & Zhao (2006); Yanto, Mula, & Kavanagh, (2011)
Ethnicity	Your ethnic or cultural group you consider yourself a member of? Please check all that apply. o American Indian or Alaska Native o Native Hawaiian or Pacific Islander o Asian o Black or African American o Hispanic or Latino o White o Other: Please specify:	Cheg & Zhao (2006)
Nationality	What is your status as a student? o Domestic o International If international, which country do you belong to? _____	Cheg & Zhao (2006)
Involvement	How often do you interact with people from different culture than your own in college setting? o Daily o Weekly o Monthly o Once in two months o Yearly	King & Hamilton (2003)
Involvement	How often do you interact with people from different culture than your own outside of college? o Daily o Weekly o Monthly o Once in two months o Yearly	King & Hamilton (2003)

In the last part of the survey, students were asked to share their email addresses if they wanted to be included in the pool of respondents to receive an incentive of a $10 Amazon gift card. Fifty gift cards were provided to participants of the survey. Also, students were asked to share their emails if they wanted to be contacted for the Phase II of the study.

3.2.4 Data Collection

The registrar's office at MSU was contacted to collect data from students. The registrar's office at MSU has access to almost every student's email and address. Due to privacy laws at MSU, the identifiable information of students cannot be shared with anyone, but the registrar's office can send out an email on behalf of the researcher. Therefore, an online survey was shared with students through the registrar's office. However, some students apply restrictions on their profile due to Family Educational Rights and Privacy Act (FERPA), so the registrar's office was not able to reach out to the whole population of the study.

The survey was prepared using an online tool (i.e., Qualtrics). A draft email including a link to the online survey and subject line to send out to students was shared with the registrar's office. The researcher's email and contact information were also included for participants to get in contact if they had any questions. The survey did not require any identifiable information from participants to maintain their privacy.

Through registrar office, emails for the survey were sent out to 10,000 students and with 29.75 response rate, 2975 complete responses were received. The responses were collected for two weeks after which no response came in and no reminder emails were sent out.

3.2.5 Analysis Design

Data analysis began with cleaning the data and reporting valid and invalid responses (Creswell, 2014). Many of the surveys were submitted without responses, with only the first

couple of questions answered. Those incomplete responses were removed from the data set. Also, any survey responses missing the answers to the sections having main variables of the study (i.e., multicultural competencies and perception of campus design elements) were removed from the study.

Descriptive analysis (i.e., percentage and frequency) were performed to summarize the characteristics of survey respondents. Various statistical analyses were then run to test the study hypotheses, including Pearson correlations, t-test, ANOVA, MANOVA, and multiple regression. The analysis plan for each hypothesis is shared in Table 8.

Table 8 Analysis plan for Research Hypotheses

Study Hypothesis	Study Variables		Statistical Analysis
	Independent Variables	Dependent Variables	
Student characteristics have a relationship with the perception of campus physical design elements	o Age o Gender o Ethnicity o Nationality of students o Interaction with diverse people outside college campus o Interaction with diverse people inside college campus	Perceived diversity support by of campus design elements i.e., o Art o Signage o Interior design o Architecture o Landscape design o graffiti	one-way ANOVA, t-test
Student characteristics have a relationship with their multicultural competency gains.	o Age o Gender o Ethnicity o Nationality of students o Interaction with diverse people outside college campus o Interaction with diverse people inside college campus	Multicultural Competencies	t-test, ANOVA

Table 8 (cont'd)

Study Hypothesis	Study Variables		Statistical Analysis
	Independent Variables	**Dependent Variables**	
Perceived diversity support by of campus design elements has a relationship with their multicultural competency gains.	Perceived diversity support by of campus design elements i.e., o Art o Signage o Interior design o Architecture o Landscape design o graffiti	Multicultural Competencies	Correlation coefficients, Multiple regression

3.2.6 Pilot Study

After completing the survey design, pilot study was done at MSU as suggested by Zeisel (1984) since pilot study helps in examining whether the survey is understandable and if any important topics are omitted. Pilot study also helps to established content validity of the study (Creswell, 2014).

For pilot study, survey was shared with the students of MSU and analyzed to make sure that that different items in the survey were measuring what they intend to measure. The pilot sample consisted of 19 participants including domestic students, international students, and students with diverse backgrounds. The pilot study helped to make sure that students were understanding the wording and language clearly. The questionnaire was revised, and wording was improved for better understanding after getting feedback from pilot study participants.

3.2.7 Reliability

Reliability is defined as "the extent to which results are consistent over time and an accurate representation of the total population and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable" (Joppe, 2000, p. 1). In order to ensure the reliability of the survey instrument and procedure, a pilot test

was conducted among MSU students. The reliability of the questions was testified using the internal reliability method of Cronbach alpha (Cronbach, 1951). Modifications were then made in a questionnaire based on the pilot study responses. Cronbach's Alpha is a coefficient dealing with the internal consistency of a scale that has been created from a group of items. The alpha varies from 0 to 1 in which 1 shows the strong internal consistency of the scale (that is, its reliability), but values equal and more than 0.7 are generally acceptable.

Results of Reliability

Survey tool had several questions regarding perception of campus design elements and student's multicultural competencies. Before proceeding to analysis to test the hypotheses of the study, reliability of each of the latent variables i.e., perception of campus art, signage, interior design, architecture/exterior design, landscape design and graffiti, and multicultural competency is presented. To ensure internal consistency of the scale, Cronbach's alpha was measured. A value of 0.7 or greater is recommended for Cronbach's alpha (Cronbach, 1990). However, values higher than 0.95 are not necessarily good, since they might be an indication of redundance (Hulin, Netemeyer, & Cudeck, 2001). "After checking the reliability of each factor using the Cronbach α coefficient, items that decreased the reliability of each factor can be removed" (Mun, Mun & Kim, 2015, p. 2099–2100).

Students' perceived diversity support of six design elements of campus (i.e., art, signage, interior design, architecture/ exterior design, landscape design and graffiti) was measured using four questions for each design element. Students' multicultural competency was also a latent variable having eleven items to record it. Table 9 shows the Cronbach's alpha values for latent variables related to campus perception and multicultural competency. Cronbach α coefficient for all variables was higher than 0.7. None of the items were removed for any of the scale.

Table 9 Cronbach's Alpha Values

Latent Variable	No. of Items	Cronbach's Alpha	Cronbach's Alpha based on standardized items
Perception of Campus Art	4	0.859	0.862
Perception of Campus Signage	4	0.855	0.856
Perception of Campus Interior Design	4	0.891	0.892
Perception of Campus architecture	4	0.887	0.888
Perception of Campus Landscape Design	4	0.887	0.888
Perception of Campus Graffiti	4	0.887	0.888
Multicultural Competency	11	0.880	0.884

3.2.7 Validity

Internal Validity is concerned with the degree to which descriptions represent the variables subject to study, and the extent to which indicators included in the survey truly measure the variables being examined and nothing else (Singleton & Straits, 1999; Groat & Wang, 2002). In this study, a pilot study was conducted among MSU students to establish validity of survey instrument. Several other tests were performed to establish validity (Cresswell, 2009; Korb, 2012 & APA, 1974) as discussed in Table 10.

Table 10 Validity of study

Validity	Test
Face Validity	To improve face validity of a survey instrument, it was reviewed by experts in the field. This helped ensuring that the measure appear to be assessing the intend construct.
Construct Validity	Confirmatory Factor Analysis (CFA) was performed to validate that those measures are appropriate to test the research hypothesis (Creswell, 2009).
Content Validity	To make sure that different items in the survey are measuring what they intend to measure, subject matter experts (SME) evaluate the tool against its specifications. Therefore, in my research, expert verification of the tool was done before administering the survey.
Criterion Related Validity	In my study, a new tool was developed to examine the relationship between physical design elements of campus and multicultural competencies of students. Similar tools exist, but they examine relationship between different constructs. In order to ensure criterion validity of the survey tool, it was compared to different established survey.

The External Validity means the extent to which the findings from a study are generalizable or transferable to bigger population (Campbell & Stanley, 1966). To deal with this, a representative land grant university was selected for this study. Therefore, the findings of this study can be applied to other similar land-grant universities.

Results for Validity- Confirmatory Factor Analysis

Since all the variables in the study model are latent variables, it is very important to make sure that their items have a strong loading, and the respective CFA model fits as per devised criteria proposed in literature. We used Hu and Bentler (1999) criteria for checking the fitness of CFA models. The cut-off criteria require the following values: CFI > 0.95; TLI > 0.8; SRMR< 0.08); RMSEA < 0.08 (Hu & Bentler, 1999). Additionally, the Chi-squared p-value was checked. According to Awad (2012), the p-value should be greater than 0.05. Finally, it was made sure that loadings on all factors were strong. A value of 0.6 or greater is acceptable for factor loadings (Awang, 2012). The results are presented in Table 11 for each of the variables:

Table 11 Validity Test Results

Latent Variable	Minimum Factor Loading	CFI	TLI	RMSEA	SRMR
Art	0.720	0.954	0.856	0.063	0.047
Signage	0.679	0.931	0.821	0.072	0.061
Exterior	0.728	0.953	0.858	0.068	0.050
Interior	0.758	0.945	0.835	0.078	0.054
Landscape	0.747	0.939	0.818	0.082	0.060
Graffiti	0.794	0.951	0.854	0.074	0.052
Multicultural Competencies	0.848	0.956	0.938	0.057	0.034

3.3 Phase II: Qualitative Methodology

In phase II of this study, qualitative data was collected from diverse participants, including MSU students and staff using a design charrette. Findings from the survey in phase I informed that the MSU Main Library was the most frequently used by the majority of the students who participated in the survey. Therefore, the lobby area of the MSU Main Library was chosen for the phase II design charrette. Six spaces in the lobby were short-listed for the design charrette. The purpose of the design charrette in this study was to redesign the lobby of the MSU Main Library to showcase design characteristics and elements that can improve students' multicultural competencies.

The word *charrette* is thought to originate from the word for cart in French, 'le chariot,' with specific reference to a pushcart that traveled the streets of 19th century Paris collecting the student artwork and architectural illustrations (Smith, 2012). The key features of the design charrette are shared in Table 12.

Table 12 Key features of Design Charrette

Key features	Design Charrette
Output and process	Drawing submission and supporting documents (e.g. reports) reached through: Knowledge dissemination, sharing views and visions, discussing options, seeking consensus + design
Communication tool/skill	Drawing + improvisation, plus support documents and multi-media capability
Design skill level	Professional/expert: Designer as key educator and facilitator; non- design trained stakeholders (public, other professionals)
Participant/event	Collaborative: Mixed technical and non-technical participants/public and group situation

Source: Smith (2012)

3.3.1 Data Collection

At the end of the survey, students were asked to share their email addresses if they were interested in taking part in the design charrette. The interested students were then sent an email about the time and date of the charrette. Since the charrette is an integrated process, related MSU officials from Diversity and Inclusive Initiative, Office of International Students and Scholars, Infrastructure Planning and Facility, and library staff were also invited to participate in this phase of the study.

After receiving feedback from students, the design charrette was conducted among various members of MSU community including students, interior design experts, people from the MSU Diversity and Inclusion office, and people from the MSU Infrastructure and Facilities (IPF) office. Three main buildings of MSU (i.e., Union building, International Center, and Main Library were shortlisted for the charrette. In the survey, students were asked if they visit any of these buildings on campus. They were able to select more than one building. Findings showed that main Library was visited by maximum students, therefore this building was decided to be designed in the charrette. After finalizing the building, people from the MSU library were also invited for the charrette. Table 13 shows out of 2975 students, how often each of the buildings mentioned above were visited by students.

Table 13 Frequency of student visits in three on campus buildings

Building	Visited by Students
Union building	2081
International Center	1838
Main library	2202

The charrette was designed to have three feedback loops, following the advice of MSU National Charrette Institute (Lennertz, 2016). Lennertz (2016) suggests that having multiple

feedback loops allows designers to land on the best design solution by allowing participants to develop trust and be open to sharing ideas. Therefore, this charrette integrated two feedback loops and took place over the course of five days. The detail of the charrette is presented in Figure 8.

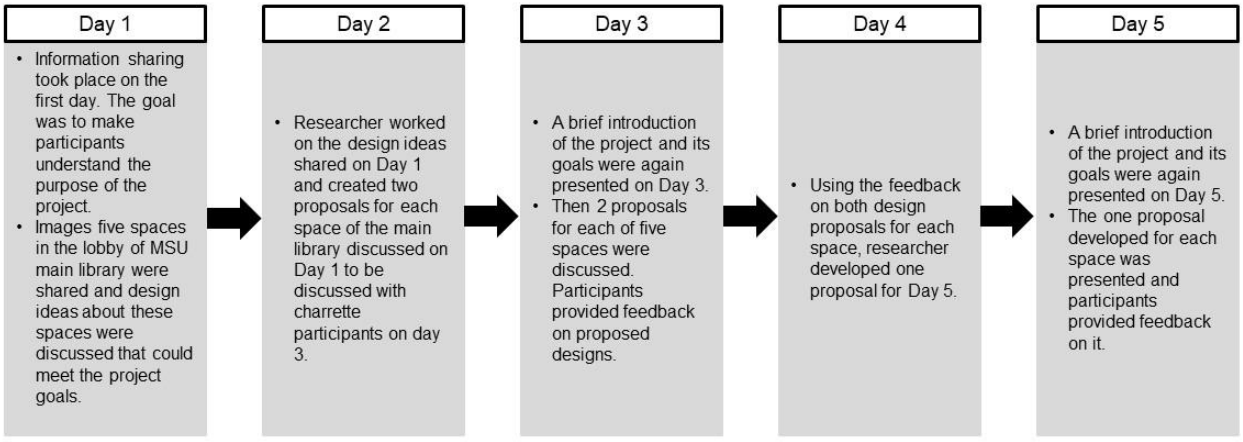

Figure 8 Charrette Design

An invitation was sent to students who showed interest in taking part in phase II of the study and related university officials a week before the charrette. A reminder email was again sent a day before the charrette. An invitation to all of the interested students and a reminder email to the participants of the first day of the charrette were sent again on day 2 to take part in the next day's charrette. Similarly, an invitation to all of the interested students and a reminder email to participants of the first two days were sent again on day 4.

The charrette was conducted using online platforms. Digital tools such as Google jam board and zoom were used to conduct the charrette. The meeting among participants happened over zoom, and the google jam board was used to share ideas. A small tutorial on how to use google jam board was shown to participants during each meeting. The video for each meeting was also recorded along with the design ideas participants provided on the google jam board.

Both meeting discussions and ideas on the Google jam board were used to design proposals for the spaces. The detailed schedule of each day of the charrette is shared in Figure 9.

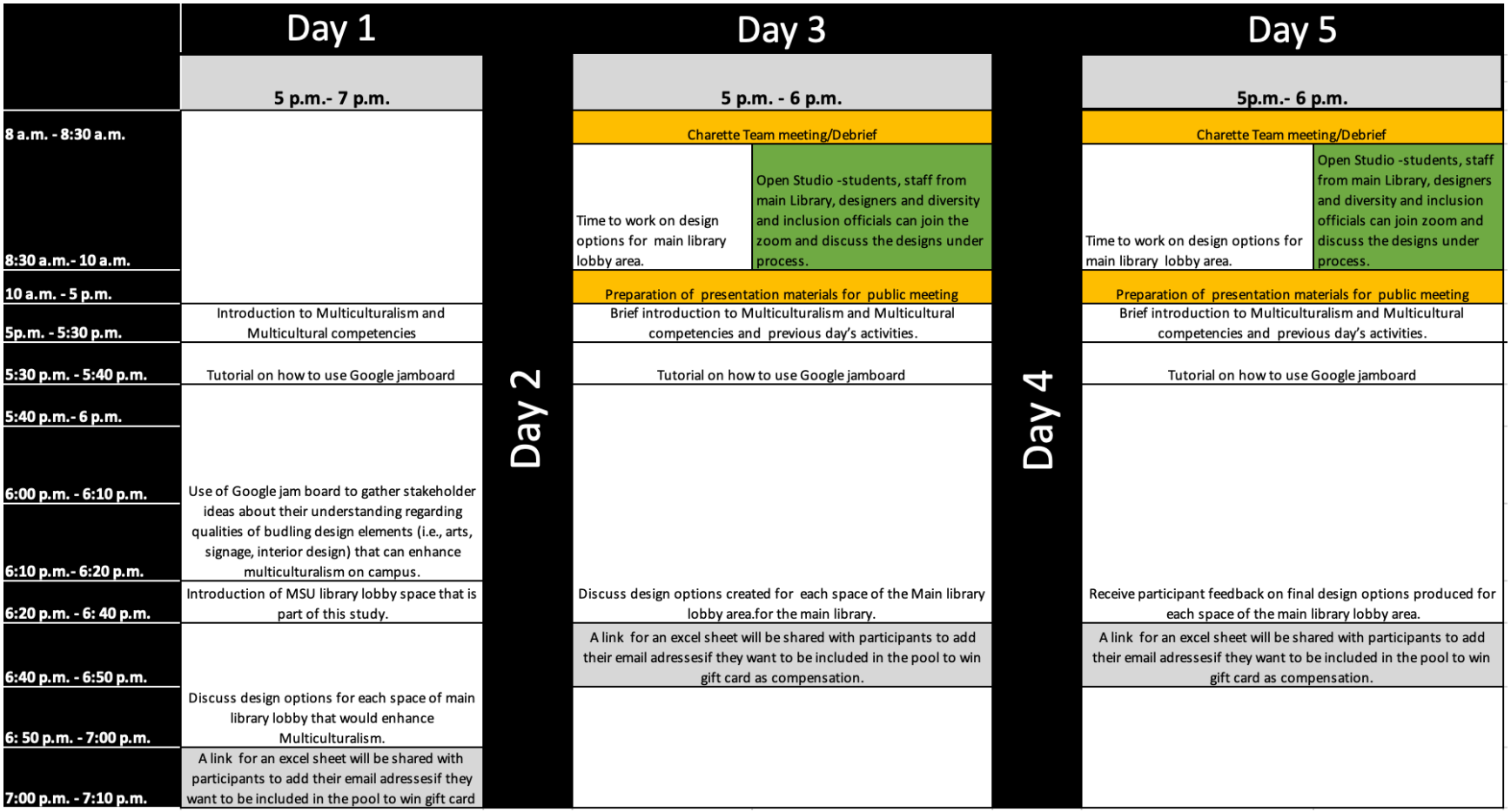

Figure 9 Schedule of Each Day of Charrette

On the first day of charrette, participants were asked to discuss characteristics of building design elements that would promote multiculturalism on campus and would ultimately enhance multicultural competencies of students. Design elements related to interior of building were considered in this phase of research i.e., art, signage, interior colors and patterns.

After this, participants were showed six images of spaces of MSU main library as marked in Figure 10 that were part of the charrette. Participants provided design feedback about each space to enhance multiculturalism. The six spaces that were included in the charrette are shown below.

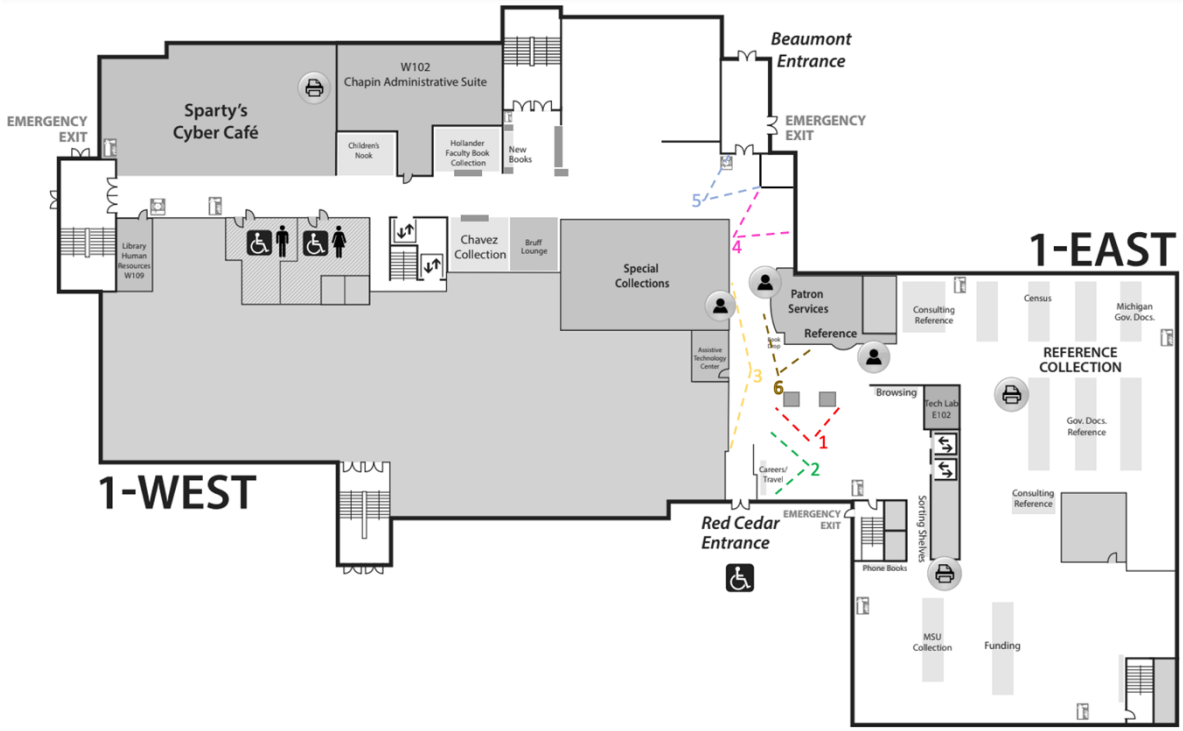

Figure 10 Map of First Floor of MSU Library

Figure 11 Image 1 of two columns with a chair at middle in entrance lobby of MSU Library

Figure 12 Image 2 of a bookshelf at the entrance oof MSU Library

Figure 13 Image 3 of a wall between both entrances of the MSU Library

Figure 14 Image 4 of a sitting space right next to the north entrance of MSU Library

Figure 15 Image 5 of partition wall while entering through North entrance of MSU Library

Figure 16 Image 6 of welcome sign after entering through south entrance of MSU Library

3.3.2 Data Analysis Design

Content Analysis was used to analyze the data collected during the charrette. The general discussion that took place on day one regarding characteristics of design elements i.e., art, signage, and interior design with respect to multiculturalism on campus and multicultural competencies of students was analyzed separately using content analysis. Then discussion regarding each of the six spaces of the main library was analyzed separately for each day of the charrette to design proposals for those spaces. Video recording of the meeting was transcripted for the analysis along with the data from Google jam board. Dedoose, a qualitative analysis software, was used to analyze charrette data.

Content analysis is defined as "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh & Shannon, 2005, p.1278). It was used because of its flexibility as a methodology to analyse data (Cavanagh, 1997) since any form of data i.e., verbal, print, or electronic canbe analysed using this methodology (Kondracki & Wellman, 2002).

The objective of content analysis is to "systematically transform a large amount of text into a highly organised and concise summary of key results" (Erlingsson & Brysiewicz, 2017, p. 94). The process of content analysis followed in this study are shared in Figure 17 (Erlingsson & Brysiewicz, 2017).

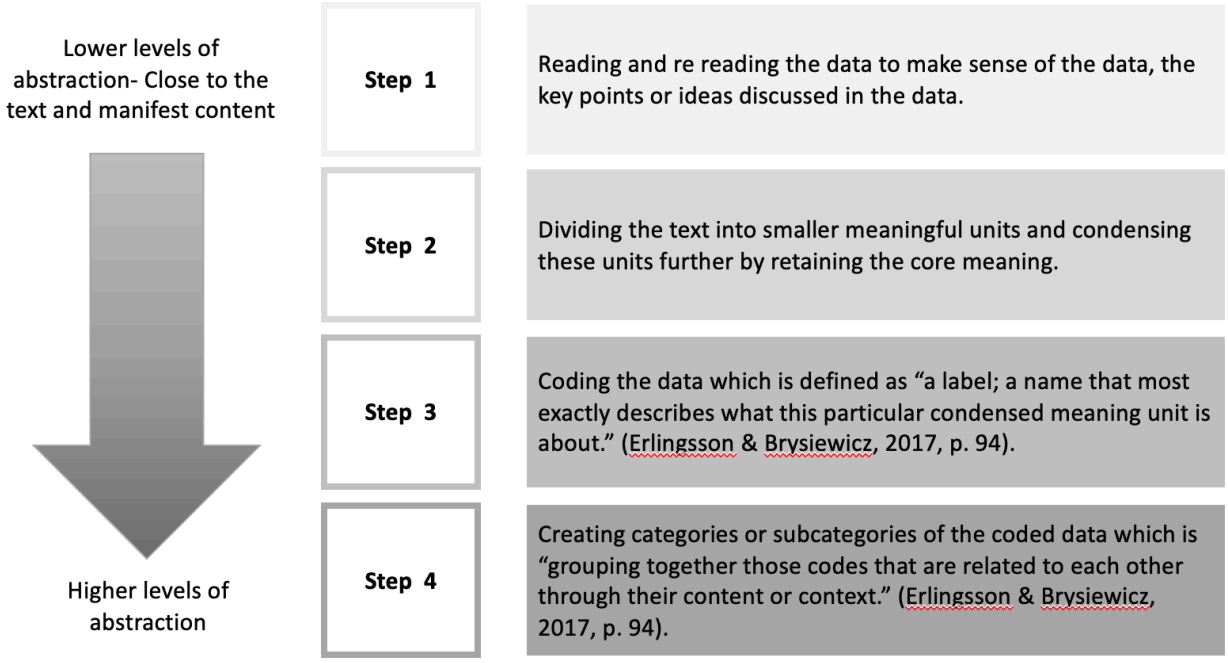

Figure 17 Steps for Content Analysis

3.3.3 Research quality

Reliability

Three forms of tests were used to ensure the reliability of content analysis, including stability, reproducibility, and accuracy (Krippendorff, 1980) as shown in Table 14. Accuracy is the strongest test for ensuring reliability in content analysis, but it is not always attainable due to ability of experts to set a standard. Therefore, reproducibility is used to ensure reliability.

Table 14 Reliability tests of Content Analysis

Reliability Tests	Procedure
"**Stability** is the degree to which a process is invariant or unchanging over time" (p. 130)	Coders rejudge the coded content after some time. If the later judgement matches the initial coding, the analysis is reliable.
"**Reproducibility** is the degree to which a process can be recreated under varying circumstances, at different locations, using different coders" (p. 131).	The same content is coded by different coders. If the judgements of each coder match, the analysis is reliable.
"**Accuracy** is the degree to which a process functionally conforms to a known standard, or yields what it is designed to yield" (p. 131)	In this test, the judgements of coder are compared to a standard.

Coding and Data Management

Validity in content analysis is established in two steps.

1- Developing a coding scheme that guides the content analysis by orienting coders towards the main concepts.

2- Access the coding decisions against some standard. If the codes match the standard for correct decision making, then the coding is regarded as producing valid data.

Chapter 4
Analysis and Findings from the Student Survey

This chapter presents the findings of the quantitative data collected from students in Phase I of the study.

4.1 General Characteristics of Respondents

A total of 3,578 participants started the survey, but only 2,975 complete responses were used for further analyses after cleaning the data and removing the incomplete survey responses. Table 15 shows that majority of the participants were female (64%), followed by male participants (32.1%). The age of respondents was categorized into seven categories. Most of the survey respondents (about 84%) were between 18-25 years of age groups. The majority of the respondents were white (75.13%), followed by Asian (16.7%). Out of 2,975 respondents, the majority were domestic students (92.6%), while 6.8% of students were international. The students were also asked how long they had stayed on campus. 31.8% of students spent less than 1 year on campus followed by 23.7% who spent 1-2 years. When asked about their frequency of interaction with diverse people inside and outside campus, majority of students reported interaction with diverse people both inside and outside campus on daily basis.

Table 15 Survey Respondent Characteristics

	Student Characteristics	Frequency	%
Gender	Male	954	32.1
	Female	1,904	64
	Other	102	3.4
	Missing	15	0.5
	Total	2,975	100

Table 15 (cont'd)

Student Characteristics		Frequency	%
Age	less than 18 years	6	.2
	18-20	1365	45.9
	21-25 years	1155	38.8
	26-30 years	268	9.0
	31-35 years	95	3.2
	36-40 years	39	1.3
	More than 40 years	39	1.3
	Missing	8	0.3
	Total	2975	100
Ethnicity	American Indian or Alaska Native	8	0.3
	Asian	420	14.7
	Black or African American	156	5.2
	Hispanic or Latino	113	3.8
	Native Hawaiian or Pacific Islander	4	0.1
	White	1997	67.1
	Other	27	0.9
	Two or more ethnicities	133	4.5
	Missing	117	3.9
	Total	2975	100
Nationality of students	Domestic Student	2755	92.6
	International Student	201	6.8
	Missing	19	0.6
	Total	2975	100
Years	Less than 1 year	946	31.8
	1-2 years	704	23.7
	2-3 years	542	18.2
	3-4 years	520	17.5
	4-5 years	146	4.9
	5-6 years	56	1.9
	More than 6 years	50	1.7
	Missing	11	0.4
	Total	2975	100

Table 15 (cont'd)

Student Characteristics		Frequency	%
Interaction with diverse people within college	Daily	1345	45.2
	Weekly	1185	39.8
	Monthly	276	9.3
	Once in two months	98	3.3
	Yearly	59	2
	Missing	12	0.4
	Total	2975	100
Interaction with diverse people outside college	Daily	1035	34.8
	Weekly	1034	34.8
	Monthly	567	19.1
	Once in two months	215	7.2
	Yearly	109	3.7
	Missing	15	0.5
	Total	2975	100

4.2 Hypotheses Testing

The research question examined in phase I of this study was if there are significant relationships among student characteristics, perceived diversity support of campus design elements, and multicultural competencies of students. To explore this question, Astin's I-E-O model (1993) was adopted, and relationships among three variables were examined in this study. Study variables and their hypothesized relationships are shown in Figure 18.

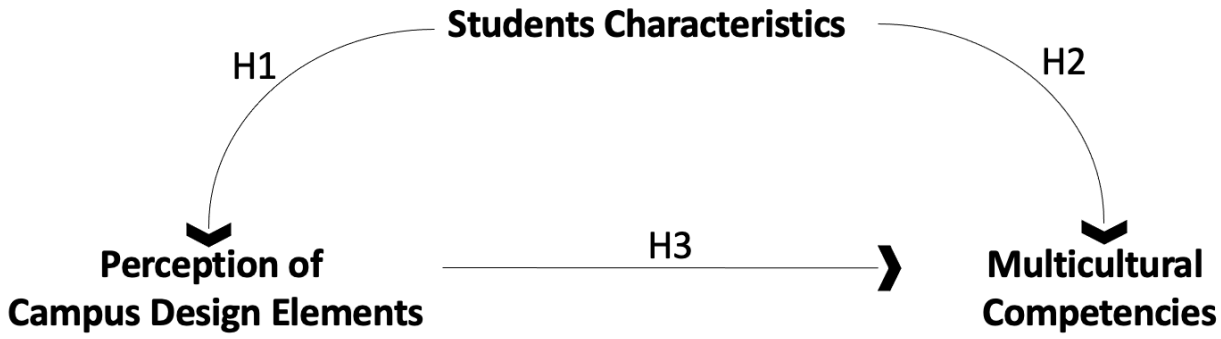

Figure 18 Study Hypotheses

4.2.1 Hypothesis 1: Student Characteristics and their perceived diversity support of Campus Design Elements

Hypothesis one stated that student characteristics have a relationship with perceived diversity support of campus design elements. The independent variables were six student characteristics variables: age, gender, ethnicity, nationality, student interaction with diverse people on campus, and interaction with diverse people off campus. The dependent variables were six campus design elements: art, signage, architecture, interior design, landscape design, and graffiti. t-tests and ANOVA were run to test these hypotheses.

Age and Perceived Diversity support by Campus Design Elements

One way ANOVA was performed to examine the effect of age on perceived diversity support by six campus design elements. The results shared in Table 16 indicate that there was statistically significant difference in mean of perceived diversity support by all six physical design elements between age groups i.e., art (F (6,2967) =8.025, p<0.001), signage (F (6,2965) =9.368, p<0.001), architecture (F (6,2965) =5.469, p<0.001), interior design (F (6,2965) =6.615, p<0.001), landscape design (F (6,2965) =6.615, p<0.001), and graffiti F (6,2965) =5.334,

p<0.001. Students between ages 18-20 and 21-25 years reported the highest mean for perceived diversity support by all campus design elements except for interior design for which less than 18 years old students reported slightly higher mean. Overall, students with age less than or equal to 25 years reported higher mean for perceived diversity support by all campus design elements.

Table 16 Age and Perceived Diversity support by Campus Design Elements: Result of One-way ANOVA

Dependent Variable	Age	N	Mean	F Value
Perceived diversity support by campus Art	less than 18 years	6	2.958	8.025*
	18-20	1365	3.533	
	21-25 years	1155	3.393	
	26-30 years	268	3.180	
	31-35 years	95	3.155	
	36-40 years	39	3.307	
	More than 40 years	39	3.267	
	Total	2967	3.427	
Perceived diversity support by campus Signage	less than 18 years	6	3.000	9.368*
	18-20	1365	3.368	
	21-25 years	1153	3.248	
	26-30 years	268	3.004	
	31-35 years	95	2.879	
	36-40 years	39	3.091	
	More than 40 years	39	3.121	
	Total	2965	3.265	
Perceived diversity support by campus architecture	less than 18 years	6	2.833	5.469*
	18-20	1365	2.984	
	21-25 years	1153	2.806	
	26-30 years	268	2.712	
	31-35 years	95	2.621	
	36-40 years	39	2.737	
	More than 40 years	39	2.940	
	Total	2965	2.875	
Perceived diversity support by interior design of campus buildings	less than 18 years	6	3.083	6.615*
	18-20	1365	3.030	
	21-25 years	1153	2.836	
	26-30 years	268	2.734	
	31-35 years	95	2.647	
	36-40 years	39	2.865	
	More than 40 years	39	3.032	
	Total	2965	2.913	

Table 16 (cont'd)

Perceived diversity support by landscape design of campus	less than 18 years 18-20 21-25 years 26-30 years 31-35 years 36-40 years More than 40 years Total	6 1365 1153 268 95 39 39 2965	3.083 3.120 2.944 2.845 2.867 2.959 3.049 3.015	6.615*
Perceived diversity support by graffiti on campus	less than 18 years 18-20 21-25 years 26-30 years 31-35 years 36-40 years More than 40 years Total	6 1365 1153 268 95 39 39 2965	3.041 3.198 3.135 2.889 2.880 2.775 2.854 3.125	5.334*

*= $p<0.001$

Gender of Students and their Perceived Diversity Support by Campus Design Elements

Independent samples t-test was run to examine the relationship between gender and perception of all campus design elements. Table 17 shows the results of t-test indicating that there was no significant difference in the perceived diversity support by any campus design element i.e., art, signage, architecture, interior design, landscape design and graffiti based on gender.

Table 17 Gender and Perceived Diversity support by Campus Design Elements: Independent Samples t-Test

	Gender	N	Mean	Std. Deviation	Std. Error Mean	F
Perceived diversity support by campus Art	Male female	954 1904	3.422 3.445	.915 .956	.029 .021	2.143
Perceived diversity support by campus Signage	Male female	954 1902	3.298 3.267	.922 .947	.029 .021	.674

Table 17 (cont'd)

Perceived diversity support by campus architecture	Male	954	3.003	1.048	.033	.411
	female	1902	2.829	1.040	.023	
Perceived diversity support by interior design of campus buildings	Male	954	3.043	1.033	.033	.021
	female	1902	2.863	1.021	.023	
Perceived diversity support by campus landscape design	Male	954	3.176	1.014	.032	1.149
	female	1902	2.952	1.040	.023	
Perceived diversity support by campus graffiti	Male	954	3.222	1.033	.033	2.391
	female	1902	3.087	1.067	.024	

Ethnicity of Student and their Perceived Diversity Support by Campus Design Elements

One way ANOVA was performed to examine the relationship between age and perceived diversity support by campus design elements. The test results shown in Table 18 revealed that there was statistically significant difference in mean of perceived diversity support of campus art (F (8,2858) =6.646, p<0.001), signage (F (8,2856) =5.198, p<0.001), and graffiti (F (8,2856) =1.718, p<0.001) between different ethnicities. White students reported the highest mean for perceived diversity support by each of these design elements i.e., art, signage and graffiti.

Table 18 Ethnicity and Perceived Diversity support by Campus Design Elements: Result of One-way ANOVA

Dependent Variable	Ethnicity	N	Mean	F Value
Perceived diversity support by campus Art	American Indian/ Alaska Native	8	3.156	6.646*
	Asian	420	3.399	
	Black/ African American	156	3.020	
	Hispanic/Latino	113	3.413	
	Native Hawaiian/ Pacific Islander	4	2.437	
	White	1997	3.490	
	Other	27	3.274	
	Two or more ethnicities	133	3.300	
	Total	2858	3.435	

Table 18 (cont'd)

Dependent Variable	Ethnicity	N	Mean	F Value
Perceived diversity support by campus Signage	American Indian/ Alaska Native	8	3.125	5.198*
	Asian	420	3.219	
	Black/ African American	156	2.918	
	Hispanic/Latino	113	3.255	
	Native Hawaiian/ Pacific Islander	4	2.812	
	White	1995	3.328	
	Other	27	3.067	
	Two or more ethnicities	133	3.123	
	Total	2856	3.273	
Perceived diversity support by campus architecture	American Indian/ Alaska Native	8	2.968	1.718
	Asian	420	2.917	
	Black/ African American	156	2.629	
	Hispanic/Latino	113	2.867	
	Native Hawaiian/ Pacific Islander	4	2.708	
	White	1995	2.896	
	Other	27	2.836	
	Two or more ethnicities	133	2.755	
	Total	2856	2.876	
Perceived diversity support by interior design of campus buildings	American Indian/ Alaska Native	8	3.187	1.937
	Asian	420	2.943	
	Black/ African American	156	2.656	
	Hispanic/Latino	113	2.913	
	Native Hawaiian/ Pacific Islander	4	2.812	
	White	1995	2.936	
	Other	27	2.827	
	Two or more ethnicities	133	2.797	
	Total	2856	2.914	
Perceived diversity support by landscape design on campus	American Indian/ Alaska Native	8	2.968	1.767
	Asian	420	3.047	
	Black/ African American	156	2.760	
	Hispanic/Latino	113	3.033	
	Native Hawaiian/ Pacific Islander	4	3.500	
	White	1995	3.036	
	Other	27	3.012	
	Two or more ethnicities	133	2.931	
	Total	2856	3.018	
Perceived diversity support by graffiti on campus	American Indian/ Alaska Native	8	2.729	1.718*
	Asian	420	3.126	
	Black/ African American	156	2.838	
	Hispanic/Latino	113	3.099	
	Native Hawaiian/ Pacific Islander	4	2.250	
	White	1995	3.166	
	Other	27	3.030	
	Two or more ethnicities	133	3.062	
	Total	2856	3.131	

*= $p<0.001$

Nationality of students and Perceived Diversity Support by Campus Design Elements

Independent samples T-test was run to examine the relationship between status of students as domestic or international and perception of all campus design elements. Table shows the results of t-test. The results indicate that there was no significant difference in perception of any campus design element i.e., art, signage, architecture, interior design, landscape design and graffiti based on student's status as domestic or international.

Table 19 Nationality of Students and Perceived Diversity Support by Campus Design Elements: Independent Samples t-Test

Dependent Variable	Status of student	N	Mean	Std. Deviation	Std. Error Mean	F
Perceived diversity support by campus Art	Domestic Student	2755	3.430	.949	.0180	.109
	International Student	201	3.379	.963	.0679	
Perceived diversity support by campus Signage	Domestic Student	2753	3.271	.943	.0179	.119
	International Student	201	3.183	.980	.0691	
Perceived diversity support by campus architecture	Domestic Student	2753	2.866	1.045	.0199	1.388
	International Student	201	2.983	1.091	.0769	
Perceived diversity support by interior design of campus buildings	Domestic Student	2753	2.904	1.028	.0196	.125
	International Student	201	3.030	1.054	.0743	
Perceived diversity support by campus landscape design	Domestic Student	2753	2.999	1.039	.0198	.975
	International Student	201	3.205	1.074	.0757	
Perceived diversity support by campus graffiti	Domestic Student	2753	3.125	1.063	.0202	.675
	International Student	201	3.128	1.020	.0719	

Student interactions with diverse people within campus and Perceived Diversity Support by Campus Design Elements

One way ANOVA was performed to examine the relationship between interaction of students with diverse people on and off campus, and their perceived diversity support by different campus design elements. The test results shown in Table 20 revealed that there was statistically significant difference in mean of perceived diversity support by campus art based on students' interaction with diverse people within campus (F (1345, 2963) =3.189, p<0.001). Students who interact daily with diverse people within campus reported the highest mean for perceived diversity support by campus art followed by those who interact with diverse people monthly and then weekly.

Table 20 Interaction of Students with Diverse People within campus and their Perception of Campus Design Elements: Result of One-way ANOVA

Dependent Variables	Frequency of Interaction	N	Mean	F value
Perception of campus Art	Daily	1345	3.488	3.189*
	Weekly	1185	3.383	
	Monthly	276	3.387	
	Once in two months	98	3.352	
	Yearly	59	3.190	
	Total	2963	3.426	
Perception of campus Signage	Daily	1345	3.285	.935
	Weekly	1183	3.249	
	Monthly	276	3.294	
	Once in two months	98	3.213	
	Yearly	59	3.080	
	Total	2961	3.265	

Table 20 (cont'd)

Dependent Variables	Frequency of Interaction	N	Mean	F value
Perception of campus architecture	Daily	1345	2.914	1.622
	Weekly	1183	2.815	
	Monthly	276	2.899	
	Once in two months	98	2.953	
	Yearly	59	2.879	
	Total	2961	2.874	
Perception of interior design of campus buildings	Daily	1345	2.942	1.429
	Weekly	1183	2.860	
	Monthly	276	2.960	
	Once in two months	98	3.016	
	Yearly	59	2.901	
	Total	2961	2.912	
	Total	2961	2.912	
Perception of landscape design on campus	Daily	1345	3.056	1.687
	Weekly	1183	2.957	
	Monthly	276	3.056	
	Once in two months	98	3.068	
	Yearly	59	2.937	
	Total	2961	3.014	
Perception of gaffitti on campus	Daily	1345	3.149	.931
	Weekly	1183	3.100	
	Monthly	276	3.153	
	Once in two months	98	3.148	
	Yearly	59	2.923	
	Total	2961	3.125	

*= $p<0.001$

Student interactions with diverse people outside and Perceived Diversity Support by Campus Design Elements

One way ANOVA was performed to examine the relationship between interaction of students with diverse people on and off campus, and their perceived diversity support by different campus design elements. The test results shown in Table 21 revealed that there was

statistically significant difference in mean of perceived diversity support by campus art (F (1035, 2960) =3.299, p<0.05), architecture (F (1034, 2958) =3.558, p<0.001), interior design of campus buildings (F (1034, 2958) =3.661, p<0.05) and landscape design (F (1034, 2958) =4.216, p<0.05) on campus based on students' interaction with diverse people outside campus. For perceived diversity support by each of these design elements, the highest reported mean was by students who interact daily with people of diverse backgrounds outside campus.

Table 21 Interaction of Students with Diverse people outside campus and their Perceived Diversity Support by Campus Design Elements: Result of One-way ANOVA

Dependent Variables	Frequency of Interaction	N	Mean	F value
Perceived diversity support by campus Art	Daily	1035	3.456	3.299**
	Weekly	1034	3.431	
	Monthly	567	3.440	
	Once in two months	215	3.380	
	Yearly	109	3.117	
	Total	2960	3.426	
Perceived diversity support by campus Signage	Daily	1034	3.263	1.991
	Weekly	1033	3.291	
	Monthly	567	3.276	
	Once in two months	215	3.250	
	Yearly	109	3.024	
	Total	2958	3.265	
Perceived diversity support by campus architecture	Daily	1034	2.941	4.558*
	Weekly	1033	2.882	
	Monthly	567	2.840	
	Once in two months	215	2.768	
	Yearly	109	2.539	
	Total	2958	2.874	

Table 21 (cont'd)

Dependent Variables	Frequency of Interaction	N	Mean	F value
Perceived diversity support by interior design of campus buildings	Daily	1034	2.956	2.661**
	Weekly	1033	2.928	
	Monthly	567	2.876	
	Once in two months	215	2.858	
	Yearly	109	2.647	
	Total	2958	2.912	
Perceived diversity support by landscape design on campus	Daily	1034	3.078	4.216**
	Weekly	1033	3.013	
	Monthly	567	2.989	
	Once in two months	215	2.953	
	Yearly	109	2.670	
	Total	2958	3.014	
Perceived diversity support by graffiti on campus	Daily	1034	3.142	1.713
	Weekly	1033	3.151	
	Monthly	567	3.126	
	Once in two months	215	3.018	
	Yearly	109	2.928	
	Total	2958	3.125	

*= $p<0.001$
**= $p<0.05$

4.3.2 Hypothesis 2: Student Characteristics and their Multicultural Competencies

Hypothesis 2 states that student characteristics have a relationship with their multicultural competency gains. To test this hypothesis, independent samples t-tests and one-way ANOVA were performed.

Age and Multicultural Competencies of Students

One way ANOVA was performed to compare the effect of age on multicultural competencies of students. The results shared in Table 22 revealed that there was no statistically significant difference in mean multicultural competency between any age groups of students ($F(6,2957) = 1.376$, $p = 0.480$).

Table 22 Multicultural Competencies and Age of students: Results of ANOVA

	Age	N	Mean	F Value
Multicultural Competency of Students	**less than 18 years**	6	3.090	1.376
	18-20	1365	3.305	
	21-25 years	1155	3.298	
	26-30 years	268	3.253	
	31-35 years	95	3.316	
	36-40 years	39	3.363	
	More than 40 years	39	3.419	
	Total	2967	3.300	

Gender and Multicultural Competencies of Students

Independent samples t-test was run between gender and multicultural competencies of students. The results shown in Table 23 revealed that there was significant difference in multicultural competencies of male (*M*= 3.235, *SD*= 0.471) and female students (*M*= 3.328, *SD*=0.424); t (2856) = -5.356, p <.001. Female students had higher mean multicultural competencies than male students.

Table 23 Group Statistics for Gender

Dependent Variable	Gender	N	Mean	Std. Deviation	Std. Error Mean	F Value
Multicultural Competencies	Male	954	3.235	.471	.015	9.574*
	Female	1904	3.328	.424	.009	

*= p<0.001

Students' Ethnicity and their Multicultural Competencies

One way ANOVA was performed to compare the effect of ethnicity on multicultural competencies of students. The results shared in Table 24 shows that there was statistically significant difference in mean competency between students' mean multicultural competencies based on their ethnicities (F (8,2858) = 8.001, p < 0.001). Black/African American students

reported the highest mean multicultural competencies, followed by Hispanic students followed by Native Hawaiian students. American Indian/ Alaska Native students had lowest mean multicultural competencies.

Table 24 Multicultural Competencies and Ethnicity of students: Results of One-way ANOVA

Dependent Variable	Ethnicity	N	Mean	F Value
Multicultural Competency of Students	American Indian/ Alaska Native	8	3.136	8.001*
	Asian	420	3.274	
	Black/ African American	156	3.490	
	Hispanic/Latino	113	3.439	
	Native Hawaiian/ Pacific Islander	4	3.431	
	White	1997	3.272	
	Other	27	3.414	
	Two or more ethnicities	133	3.360	
	Total	2858	3.296	

*= $p<0.001$

Nationality of students and their Multicultural Competencies

Independent samples t-test was run between status of students as domestic or international, and multicultural competencies of students. Table 25 shows that there was significant difference in multicultural competency of domestic students (M= 3.306, SD= 0.44) and international students (M= 3.21, SD=0.45); t (2954) = 2.720, $p<0.05$. Domestic students reported higher mean multicultural competency than international students.

Table 25 Group Statistics for Student Nationality and their Multicultural Competency

Dependent Variable	Nationality of Students	N	Mean	Std. Deviation	Std. Error Mean	F Value
Multicultural Competencies	Domestic Student	2755	3.306	.443	.008	0.007**
	International Student	201	3.218	.455	.032	

**= $p<0.05$

Student Interactions with Diverse People within College and their Multicultural Competencies

ANOVA was performed to compare the effect of student's interaction with culturally diverse people inside and outside college on multicultural competencies of students. A one-way ANOVA revealed that there revealed that there was statistically significant difference in multicultural competency of students based on their interaction with culturally diverse people inside college (F (4,2958) = [23.914], p <0.001). Students who interacted with diverse people within college daily had highest mean multicultural competency.

Table 26 Multicultural Competencies and Interaction with Diverse People Within College: Results of one-way ANOVA

Dependent Variable	Interaction with diverse people inside college	N	Mean	F value
Multicultural Competencies	Daily	1345	3.372	23.914*
	Weekly	1185	3.271	
	Monthly	276	3.192	
	Once in two months	98	3.079	
	Yearly	59	3.094	

*= p<0.001

Student Interactions with Diverse People within College and their Multicultural Competencies

One-way ANOVA was performed to examine the relationship between student's interaction with culturally diverse people outside college and their multicultural competencies. The results shared in Table 27 revealed that there was statistically significant difference in multicultural competency gain of students based on their interaction with culturally diverse people outside college (F (4,2955) = [43.618], p <0.001). Students who interacted with diverse people outside college on daily basis had highest mean multicultural competency.

Table 27 Multicultural Competencies and interaction with diverse people outside college: Results of ANOVA

Dependent Variable	Interaction with diverse people outside college	N	Mean	F value
Multicultural Competencies	Daily	1035	3.423	43.618*
	Weekly	1034	3.282	
	Monthly	567	3.222	
	Once in two months	215	3.121	
	Yearly	109	3.058	
	Total	2960	3.300	

*= $p<0.001$

4.3.3 Hypothesis 3: Perceived diversity Support of Campus Design Elements has a Relationship with Multicultural competencies of Student.

Hypothesis 3 states that there exists a relationship between students' perceived diversity support of campus design elements (art, signage, architecture, interior design, landscape design, graffiti) and their multicultural competencies. Correlation coefficients and multiple linear regression was performed to examine these relationships.

Table 28 shows that there exists a significant correlation between student's perceived diversity support by each campus design element and their multicultural competencies i.e., art (r (2975) = 0.22, $p<0.001$), signage (r (2973) = 0.19, $p<0.001$), interior design of campus buildings (r (2973) = 0.18, $p<0.001$), architecture (r (2973) = 0.18, $p<0.001$), landscape design (r (2973) = 0.17, $p<0.001$) and graffiti (r (2973) = 0.14, $p<0.001$).

Table 28 Correlation Coefficients between Students perception of campus physical design elements and their multicultural competency gains

Perceived diversity support by Campus Physical Design Elements	Multicultural Competencies
Campus Art	0.220**
Campus Signage	0.196**
Interior Design of Campus Buildings	0.180**
Campus Architecture	0.189**
Landscape Design on Campus	0.172**
Graffiti on Campus	0.147**

**. Correlation significant at 0.001 level

To explore the relationship further, regression analysis was conducted as it is more elaborate than correlation in explaining the relationship between dependent and independent variables.

Student's Perceived Diversity Support by Campus Art and their Multicultural Competencies

Simple linear regression was performed to examine the relationship between perceived diversity support of campus art by students and their multicultural competencies. Table 29 shows that student's perceived diversity support by campus art can play a significant role towards their multicultural competency (F [1, 2973] = 151.596, p <0.001, R^2 = 0.049). R^2 = 0.049 depicts that it explains 4.9% of the variances in student's multicultural competencies.

Table 29 Regression Analyses between Student's Perception of Campus Art and their Multicultural Competencies

Model		Sum of Squares	df	Mean Square	F	Sig.
Perception of campus art predicting Multicultural Competencies of students	Regression	28.622	1	28.622	151.596	<.001
	Residual	561.307	2973	.189		
	Total	589.929	2974			
Note R^2= 0.049						

Table 29 (cont'd)

Independent Variables	Unstandardized Coefficients		Standardized coefficients Beta	t
	B	Std. Error		
Perceived diversity support by campus Art	.103	.008	.220	12.312*

* = p<0.001

Student's Perceived Diversity Support by Campus Signage and their Multicultural Competencies

Simple linear regression was performed to examine the relationship between perceived diversity support of campus signage by students and their multicultural competencies. Table 30 shows that student's perceived diversity support by campus signage can play a significant role towards their multicultural competency (F [1, 2971] = 118.935, p <0.001, R^2 = 0.038). R^2 = 0.038 depicts that it explains 3.8% of the variances in student's multicultural competencies.

Table 30 Regression Analyses between Student's Perception of Campus Signage and their Multicultural Competencies

Model		Sum of Squares	df	Mean Square	F	Sig.
Perception of campus art predicting Multicultural Competencies of students	Regression	22.697	1	22.697	118.935	<.001
	Residual	566.966	2971	.191		
	Total	589.663	2972			
Note R^2= 0.038						

Independent Variables	Unstandardized Coefficients		Standardized coefficients Beta	t
	B	Std. Error		
Perceived diversity support by campus Signage	.092	.008	.196	10.906*

* = p<0.001

Student's Perceived Diversity Support by Campus Srchitecture and their Multicultural Competencies

Simple linear regression was performed to examine the relationship between perceived diversity support of campus architecture by students and their multicultural competencies. Table 31 shows that student's perceived diversity support by campus architecture can play a significant role towards their multicultural competency (F [1, 2971] = 110.347, p <0.001, R^2 = 0.036). R^2 = 0.036 depicts that it explains 3.6% of the variances in student's multicultural competencies.

Table 31 Regression Analyses between Student's Perception of Campus Architecture and their Multicultural Competencies

Model		Sum of Squares	df	Mean Square	F	Sig.
Perception of campus art predicting Multicultural Competencies of students	Regression	21.117	1	21.117	110.347	<.001
	Residual	568.546	2971	.191		
	Total	589.663	2972			
Note R^2= 0.036						

Independent Variables	Unstandardized Coefficients		Standardized coefficients Beta	t
	B	Std. Error		
Perceived diversity support by campus architecture	.080	.008	.189	10.505*

* = p<0.001

Student's Perceived Diversity Support by Interior Design of Campus Buildings and their Multicultural Competencies

Simple linear regression was performed to examine the relationship between perceived diversity support of interior design of campus buildings by students and their multicultural competencies. Table 32 shows that student's perceived diversity support by interior design of campus buildings can play a significant role towards their multicultural competency (F [1, 2971]

= 99.592, p <0.001, R^2 = 0.032). R^2 = 0.032 depicts that it explains 3.2% of the variances in student's multicultural competencies.

Table 32 Regression Analyses between Student's Perception of Interior Design Of Campus Buildings and their Multicultural Competencies

Model		Sum of Squares	df	Mean Square	F	Sig.
Perception of campus art predicting Multicultural Competencies of students	Regression	19.125	1	19.125	99.592	<.001
	Residual	570.537	2971	.192		
	Total	589.663	2972			
Note R^2= 0.032						

Independent Variables	Unstandardized Coefficients		Standardized coefficients Beta	t
	B	Std. Error		
Perceived diversity support by interior design of campus buildings	.078	.008	.180	9.980*

* = p<0.001

Student's Perceived Diversity Support by Campus Landscape Design and their Multicultural Competencies

Simple linear regression was performed to examine the relationship between perceived diversity support of campus landscape design by students and their multicultural competencies. Table 33 shows that student's perceived diversity support by campus landscape design can play a significant role towards their multicultural competency (F [1, 2971] = 90.139, p <0.001, R^2 = 0.029). R^2 = 0.029 depicts that it explains 2.9% of the variances in student's multicultural competencies.

Table 33 Regression Analyses between Student's Perception of Campus Landscape Design and their Multicultural Competencies

Model		Sum of Squares	df	Mean Square	F	Sig.
Perception of campus art predicting Multicultural Competencies of students	Regression	17.363	1	17.363	90.139	<.001
	Residual	572.299	2971	.193		
	Total	589.663	2972			
Note R^2= 0.029						

Independent Variables	Unstandardized Coefficients		Standardized coefficients Beta	t
	B	Std. Error		
Perceived diversity support by campus landscape design	.073	.008	.172	9.494*

* = p<0.001

Student's Perceived Diversity Support by Graffiti on Campus and their Multicultural Competencies

Simple linear regression was performed to examine the relationship between perceived diversity support of campus graffiti by students and their multicultural competencies. Table 34 shows that student's perceived diversity support by campus graffiti can play a significant role towards their multicultural competency (F [1, 2971] = 65.970, p <0.001, R^2 = 0.022). R^2 = 0.022 depicts that it explains 2.2% of the variances in student's multicultural competencies.

Table 34 Regression Analyses between Student's Perception of Graffiti on Campus and their Multicultural Competencies

Model		Sum of Squares	df	Mean Square	F	Sig.
Perception of campus art predicting Multicultural Competencies of students	Regression	12.809	1	12.809	65.970	<.001
	Residual	576.854	2971	.194		
	Total	589.663	2972			
Note R^2= 0.022						

Table 34 (cont'd)

Independent Variables	Unstandardized Coefficients		Standardized coefficients Beta	t
	B	Std. Error		
Perceived diversity support by campus graffiti	.062	.008	.147	8.122*

* = p<0.001

4.3 Summary of the Results

Hypotheses of the study were tested using different statistical analyses. Table 35 shows the summary weather each of the hypothesis was supported or not. Partially supported hypothesis means that for some categories of variables significant relationship was observed while for some, there was no significant relationship found.

Table 35 Summary of Survey Results

Hypotheses		Sub-Hypotheses		Hypothesis Supported
1.	Student Characteristics have a relationship with their perceived diversity support of Campus Design Elements	1.	Age of students has a relationship with their perceived diversity support of Campus Design Elements	Yes
		2.	Gender of students has a relationship with their perceived diversity support of Campus Design Elements	No
		3.	Ethnicity of students has a relationship with their perceived diversity support of Campus Design Elements	Partially
		4.	Nationality of students has a relationship with their perceived diversity support of Campus Design Elements	No
		5.	Interaction of students with diverse people within campus with their perceived diversity support of Campus Design Elements	Partially
		6.	Interaction of students with diverse people outside campus with their perceived diversity support of Campus Design Elements	Partially
2.	Student Characteristics have a relationship with their Multicultural Competency	1.	Age of students has a relationship with their Multicultural Competency	No
		2.	Gender of students has a relationship with their Multicultural Competency	Yes
		3.	Ethnicity of students has a relationship with their Multicultural Competency	Yes
		4.	Nationality of students has a relationship with their Multicultural Competency	Yes
		5.	Interaction of students with diverse people within campus with their Multicultural Competency	Yes
		6.	Interaction of students with diverse people outside campus with their Multicultural Competency	Yes
3.	Student's perceived diversity support of Campus Design Elements has a relationship with their Multicultural Competency	1.	Perceived diversity support by campus art	Yes
		2.	Perceived diversity support by campus signage	Yes
		3.	Perceived diversity support by campus architecture	Yes
		4.	Perceived diversity support by interior design of campus buildings	Yes
		5.	Perceived diversity support by campus landscape design	Yes
		6.	Perceived diversity support by campus graffiti	Yes

Chapter 5
Analysis and Findings from Design Charrette

This chapter explains the findings from design charrette that was conducted over three days and several members of campus community including students, diversity experts, people who work at MSU library and people from IPF, MSU participated in this charrette.

5.1 General Characteristics of Charrette Participants

Total of 29 participants took part in the charrette over the course of three days. The demographics of charrette participants is shown in Table 36.

Table 36 Gender of Charrette participants

Charrette Participants Characteristics			n
Gender	Day 1	Male	4
		Female	6
	Day 2	Male	5
		Female	6
	Day 3	Male	3
		Female	5
Occupation	Students	International	7
		Domestic	11
	University Employees	Project coordinator and management expert	1
		Architect from IPF, MSU	1
		Construction Manager from IPF, MSU	1
		Diversity and Inclusion expert	1
		MSU Library staff	1

Since google jam board was used for charrette and participants were adding their design recommendations and comments on it without providing any identifiable information or writing their names, it is difficult to identify which comments were provided by which participant. Therefore, information regarding the participant is not shared below with the quotations or comments.

5.2 Characteristics of Multicultural Spaces on Campus

The feedback received by participants on Day 1 regarding the characteristics of building design elements that would promote multiculturalism on campus and would ultimately enhance multicultural competencies of students was analyzed using content analysis.

Charrette participants gave several suggestions regarding design of campus art to reflect multiculturalism. Some of the major themes that were presented are:

- Paintings should reflect cultures and personalities from different parts of the world.
- Paintings should also include natural scenes as a lot of people can relate to nature.
- Posters should have pictures and recopies of food from around the world.
- Photographs should also be of food, cultures, and personalities from around the world.
- Statues should be of large size so that people can interact with them and statues of important personalities from around the world along with their description should be placed on campus.

Table 37 shows the detail design ideas shared by charrette participants regarding each of the design elements to enhance multiculturalism on campus.

Table 37 Characteristics of Campus art to Enhance Multiculturalism

Type of Art	Design suggestions	Example Quote
Paintings	1. Use many small paintings	"Instead of one large painting, there can be many small paintings so that users of the space can learn more from them."
	2. Use cultural paintings	"Paintings from different cultures." "A giant mural flowing from one culture to the other." "Landmarks or other famous sites from around the world." "Street scenes from around the world"
	3. Use personalities depicted paintings	"Paintings of influential people from different parts of the world" "Paintings of National Heroes"
	4. Use natural sceneries	"Landscapes that remind students of home." "Landscapes that resonates with students such as national park or the beach or a Bay Area."
Posters	1. Show international food posters 2. Involve student clubs	"Posters of different foods with recipes." "Posters from different international student organizations such as cultural posters" "Posters of different student clubs."
Photographs	1. Show international food photos	"Photographs of food from around the world."
	2. Show landscapes	"Photographs of different landscapes."
	3. Show people and cultures	"Photographs of people with national dresses and street views." "Photographs of people from around the world doing their cultural activities." "Famous personalities from different countries. "
Statuary	1. Large size statues	"Statues that can be interacted with such as climbed on, or taken selfies with etc."
	2. Statues of non-living things	"Actual objects as statues because they are more acceptable to a lot of people, and you can convey cultures more easily through objects." "Landmarks from around the world that make people get curious and read about them." "Statues of objects such as building models or models of cities."
	3. Statues of personalities	"Statues of Important personalities in History from around the world with their introduction written in words."

For interior design elements explored in this study, participants gave several suggestions to reflect multiculturalism. The major ideas presented are:

- Interior colors should reflect different cultures and also nature should be included in the interior spaces to add color.

- Mixed interior lights (cool and warm) should be used with cultural lights from around the world.
- Natural light should be introduced a lot in the spaces through design.
- Cultural textures and patterns from around the world along with natural textures and patterns should be used in the interior spaces.

The detail comments of the charrette participants are shared below.

Table 38 Characteristics of Interior Design Elements to Enhance Multiculturalism on Campus

Interior Design	Design suggestions	Example Quote
Interior Colors	1. Colors through Nature 2. Colors representing cultures 3. Neutral or pastel Colors	"Use plants to green up a space." "Colors can vary in different areas representing different cultures for example with the use of paintings." "There are some prominent colors in different cultures such as in Asia, people use a lot of pink." "Having specific color will alienate some people. white, of white, beige are neutral colors that allows just about anyone to feel at home in the space." "Pastel colors are nice as they are easy on the eyes and calming."
Interior Lighting	1. Color of Lights 2. Design of light 3. Natural Light	"Mixed lighting such as overhead bright (cool) lights with warmer lamps around." "Cultural lights, like those paper lights of Asia and Lanterns from Middle East." "Cultural lights can hang over each of the study tables perhaps where the student is just focusing on work and meaningful course as well." "If you're trying to direct people to certain spaces, you might be able to string cultural lights so that people kind of follow them like a trail." "More natural light in architecture is always nice especially in winter." "Have a room where there is an artificial perpetual sunset."

Table 38 (cont'd)

Interior Design	Design suggestions	Example Quote
Interior Textures and Patterns	1. Cultural Textures and Patterns 2. Natural Textures and Patterns Old Rustic look	"A giant patchwork mural that has patterns from all over the world." "Cultural patterns such as Truck art or patterns of bird's feathers like Peacocks." "Interior walls with natural patterns like stones. - Textures that of are natural material like wood, rock, concrete, natural wood." "Interior depicting Nature." "Use patterns that represent old-timey things." "Rounded windows because they look really pretty and old-timey." "Walls that feel like old-timey concrete versus smooth paint."

For the design of signage, following suggestions were provided by charrette participants to enhance multiculturalism on campus. These include:

- Signage should be provided in multiple languages including symbology as symbology is universal in nature and is understood by a lot of people.
- Different cultures should be represented in signage design through use of cultural patterns and colors.

Table 39 Characteristics of signage to enhance multiculturalism on campus

Signage	Design suggestions	Example Quote
Use of multiple languages	1. Multiple languages 2. Symbology	"Welcome sign should be in every language. " "Include a few languages that we think are accepted by or understood by most people as signs with different languages make people happy!" "Perhaps use Symbology instead of a language. Symbology is not associated with certain language. It's a universal language and everyone understands it."
Use of Colors and Patterns	1. Different Colors 2. Illuminating signs 3. Use of University Mascot	"Use oof colorful textures, especially use of colors of different countries." "Using flags from different countries." "Backgrounds of Written Signs such as Enter/Exit with cultural Patterns such as Truck art from Pakistan." "Consider Colors for accessibility such as color blindness." "Signs can be illuminated so that their backgrounds change colors according to different national days. Maybe it can be done with both colors and patterns" "Use of University mascot such as sparty at MSU wearing different countries traditional dress."

5.3 Redesigning Spaces in the University Library to Enhance Multiculturalism

5.3.1 Space 1

Space 1 is right Infront when one enters from the south entrance of the library. These are two columns with a clock hanging on one side of one column. The image of the space is shown in Figure 19.

Figure 19 Space 1: Image of Two Columns with a Chair at middle in the Entrance Lobby of MSU Library

On the first day of charrette, participants discussed the design of the space and gave several design related ideas for the space that could improve multicultural nature of the space. These are shared below.

Art	"A digital clock that shows times from around the world with pictures of those places."
	"Clock with the background of flags of all countries."
	"A sculpture that connects the columns at the top for example, someone leaning against one column with feet on the other reading a book."
	"Terrarium between the pillars instead of a chair."
	"Space needs more color."
	"Put some color, art, texture on those pillars, all different on each side."
Interior textures/patterns	"Clock can have cultural background like a pattern."
	"At least some sofas should have cultural textures or even built for example, African Garments that people wear."
Interior Lighting	"Do something to the ceiling. Perhaps the lights we talked about or pattern."
	"Giant LED panels that cover all of the pillars."

Using this feedback, two design proposals were made for the second day of charrette. Participants of the charrette then commented on the designs and gave further suggestions for improvements to enhance multiculturalism. The proposals along with the comments are shared below.

Figure 20 Proposal 1 for space 1

On each side of the column, clocks with flags and time of different countries along with mural of famous landmarks from those countries were used. Murals were colorful and abstract in nature. The print on the sofa was also changed to add some pattern.

Comments from Charrette Participants on proposal 1

"For the clocks, you can rely on the data about the countries that international students come to MSU from. The most frequent 8 countries should be included."

"Honduras, Nigeria, Brazil, or any other Black Country instead of New York. Black countries or cultures are not represented on campus."

"Since these pillars are in an entranceway, probably unlikely the chair will be utilized. Why not a display screen or singular object that adds to the design?"

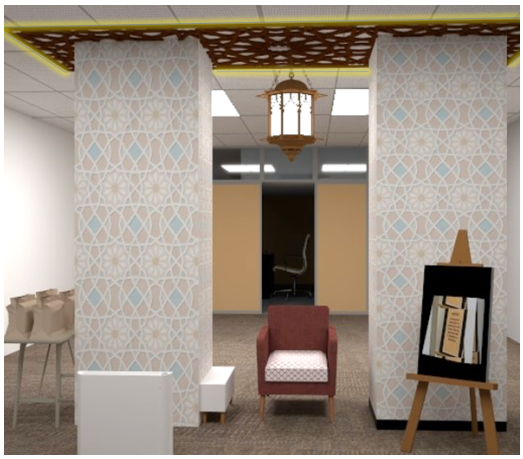

Figure 21 Proposal 2 for space 1

A geometric ceiling panel along with geometric patterned hanging light that is prevalent in many Islamic countries like Turkey, Pakistan etc. with LED back lights was introduced in the space between columns. Also, the pattern on the columns was also geometric as found in Islamic architecture.

Comments from Charrette Participants on proposal 2

“I like the patten on the columns, but I don't feel any sense of belonging from it as I do the other one.”

“This one is more calming than the other proposal.”

“The pictures of monuments from the other scene can be put here. Smaller in size and without the clocks.”

“This design is better for a modern, chic look, but I think it misses the goal for multicultural design.”

These comments were used to develop one last proposal for the space that was shared on day three of the charrette.

Figure 22 Final proposal presented on day 3 for space 1

In this last concept, both previous proposals were merged. Using MSU student population stats, clocks of countries with majority students at MSU were added. Murals of landmarks from these countries in black were added over geometric pattern of columns. The ceiling and light were kept for this proposal as suggested by some participants. Participants provided feedback on this design proposal as well which is shared below.

Comments from Charrette Participants on Proposal 3

“I love this light, but I feel like it doesn't belong here.”

“This feels like there is a lot going on here, maybe simplify it somehow.”

“There is opportunity for digital/tactile/interactive architecture in this space.”

“Accessibility should also be considered here in the design of clocks.”

“Also, queer narratives and queer histories from these countries can also be included and uplifted here.”

“Include representation from Michigan Indigenous cultures. Maybe lifting narratives of the Ojibwe, Ottawa Potawatomi tribes and placing a land acknowledgement somewhere in the library as well.”

5.3.2 Space 2

Space 2 is a bookshelf next to the south entrance of the library. The image of the space is shown in Figure 23.

Figure 23 Image of a Bookshelf at the Entrance of MSU Library

Following feedback was provided by charrette participants on the first day of charrette regarding this space.

Interior Color	"Different color board. The dark green makes the space look small."
	"Darker color bookshelf - makes it look grander"
Interior texture/Pattern	"Replace the bookshelf as a barrier with a decorative patterned something from another culture."
	"Can we do circular seating and put the books around the outside of them? Open up that brick wall."
	"Let that brick wall shine."
	"Bookshelf serves the practical purpose of blocking access around the security gate."

Using the feedback of charrette participants, the two proposals prepared for this space are shared below.

Figure 24 Proposal 1 for space 2

The bulletin board was removed in this proposal and the height of bookshelf was increased. Also, the color was made darker than the actual color. The partition wall was also made of glass with a Mexico inspired cultural pattern.

Comments from Charrette Participants on proposal 1

“Lower or middle height bookshelves are more inclusive for all.”

“The idea of the glass patterned partition is beautiful.”

“Add crystals on shelf.”

“The colors are very nice on the design”

“Again, I like what you've done with the carpet. It doesn't detract from other features and isn't dizzying.”

“I like seeing the brick wall.”

“There's potential to combine cultural elements with geographical elements here - using plants relative to that region”

Figure 25 Proposal 2 for space 2

In this proposal, the color of the bulletin board was changed into a lighter color. The bookshelf was removed to increase the visibility of brick wall. Also, the partition wall was changed into a cultural pattern from Mughal architecture which is prevalent in many South Asian countries.

Comments from Charrette Participants on proposal 2

“I like this one because the design is interesting.”

“I like the wall patterns.”

“I find this screen wall very visually interesting but would prefer it be full height if possible.”

“Like the color of the carpet and the white screen. Some standing tables (without chairs) here could be helpful too.”

“Furniture - woven seats with cushions inspired by global designs

Using the feedback provided on both options above, another option for the third day of charrette was prepared and presented. It is shared below.

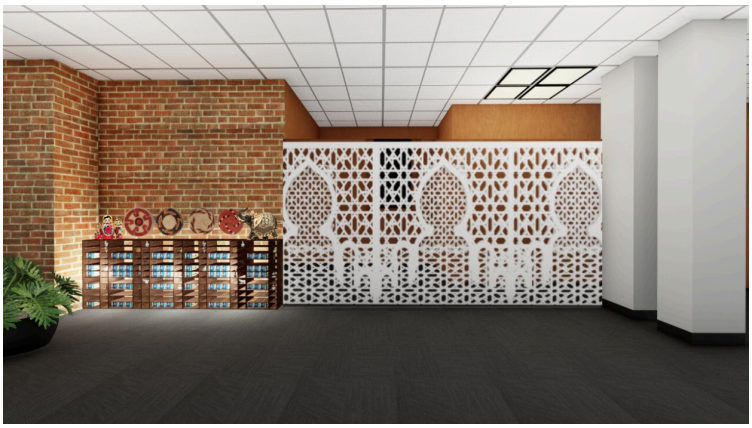

Figure 26 Final proposal presented on Day 3 for Space 2

The bookshelf was kept small and in dark color. Crystals and other cultural artifacts from around the world were added on the shelf along with books. The partition wall was kept in the geometric cultural pattern from Mughal architecture. The bulletin board was removed, and brick wall was kept as it is.

Comments from Charrette Participants on Proposal 3

The participants commented on the third proposal on day three of the charrette and commented as follows:

"There can be a collection of items that can rotate out around in the shelf."

"This partition is too tall. Perhaps the height of the original book rack shall be retained for this textured wall as well."

"The beautiful cutout architecture clashes with the brick structure of the wall. I would love to see that work in another part of the library but it's a bit jarring for me here."

"I like the smaller book rack with the items on top of it."

5.3.3 Space 3

Space 3 was the wall on the left side as one enters from south entrance of the library and moves towards north entrance as shown in Figure 27.

Figure 27 Image of a Wall Between Both Entrances of the MSU Library

The quotes of charrette participants regarding the design of this space are shared below.

Art	"Remove everything from the wall and make it into a multicultural art exhibit: pictures, textures. etc. to draw users in."
	"Display a map with water stressed regions of the world right above the drinking fountain"
	"Flier extinguisher looks ugly and maybe replace with ar."
Interior Color	"Maybe add dark green carpet to represent MSU. with an image of Sparty."
Interior	"The wooden pattern of the wall is very boring"
Texture/Patterns	"There is an overuse of wooden panels."
	"I actually like the wall and its texture. I don't like the stuff hanging on it. It takes away from the beauty of the wall. Maybe put all the hangings to the right of the fire panel."
	"Oak paneling is so ugly."
	"The dark color of the walls **looks** depressing, It need to a be a lighter shade for example stone pattern."

Using participants' feedback, two options prepared for the second day of charrette are shared below.

Figure 28 Proposal 1 for space 3

In this proposal, the wooden texture of the wall was replaced by light colored stone texture. A map of water stressed areas of the world was hanged over the water fountain. The flyer boxes and other bulletin boards were moved to the right of the fire extinguisher as one panel.

Comments from Charrette Participants on proposal 1

"This white board going to be filled with postings and papers and may detract from the aesthetic of the wall."

"The design on the wall looks good since we will have notices put up on the notice boards to make them more distinguishable. But in general, this design looks quite dull."

"Both proposals are good designs and feel welcoming. If I should choose, I would choose the pattern as it adds element to the space."

Figure 29 Proposal 2 for space 3

The color of the wall was made lighter. Also, an art installation was proposed on the wall which is map of the world with times of different countries shown on the clock. This was proposed with the idea of user interaction with this art installation.

Comments from Charrette Participants on proposal 2

“This map would become a regular spot for discussions among students. Which is great!”

“I like both proposals. They both speak to me. I do like the map with the varying clocks with times. However, the pattern on the other proposal is amazing.”

“May be combine both proposals.”

“Bring the map over the fountain in the other proposal to this one, and it becomes perfect.”

“great design! But maybe it is better to add "hello" in different languages or flags of some counties.”

“The graphic on the wall looks very beautiful and attractive. “

Using the feedback provided on both options above, another option for the third day of charrette was prepared and presented. It is shared below.

Figure 30 Final proposal presented on Day 3 for Space 3

In the third proposal for the third day of charrette, the wall was kept in stone pattern. The map with water stressed areas of the world was kept over the water fountain. Also, the art installation on the right which was world map was kept. It was lit with led lights and on this map, "hello" was written in each country's language.

Comments from Charrette Participants on Proposal 3

"Opportunity for digital architecture/interaction with map and visitors."

"Hello in languages will be extremely cool."

"I love the map! And it complements the welcome sign that has many languages on it."

"This is an exquisite idea!!! I love the map and the languages in their native scripts."

"Use this as the central starting/anchor point of multiculturalism and work out from here. Create the other spaces in one culture/country to simulate the idea of traveling."

"Hand sanitizer/mask dispensers, other objects can be transformed into art from around the world."

"This is my favorite so far. Maps are always good."

5.3.4 Space 4

Space 4 is the sitting area on the left side when person enters from the north entrance of the library. The space is shown in Figure 31.

Figure 31 A Sitting Space right next to the North Entrance of the MSU Library

To redesign this space s that its design could enhance multiculturalism, participants gave several design related suggestions. These are shared below.

Art	"This looks like the reading material. This can instead be an interactive screen. Or just a screen continuously showing videos from around the world. It would be a good stop for all library visitors."
	"Mount the screen, thus creating more space."
Interior Colors	"Use pastel colors and gentle patterns."
Interior Textures/Patterns	"Add Turkish Carpets. "
Interior Lights	"These lights can easily be replaced with cultural lights, like they have in China Town."
	"Place a lamp in place of the plant between both chairs."

"There's an overload of wooden patterns everywhere. I vote for replacing the wooden things with nonwooden things."

"Put some wallpaper on the walls."

Using this feedback, following two options were presented to charrette participants for feedback on day two.

Figure 32 Proposal 1 for space 4

In this proposal, a Turkish rug was added to the space. The plant between both chairs was replaced with a lamp. A painting of landscape was added in the space as well. Pastel colors were used on the column with screen mounted on it.

Comments from Charrette Participants on proposal 1

"This one feel more welcoming and the lighting is perfect."

"Pros of this design are the rainbow colors on the panel which make it brighter and the rug."

"This design is more neutral."

"Decorate column in two cultures: western and eastern."

"Include some Spartan branding."

"The arm rail on the chairs can be softer and comfier than hard."

"I like a table with a light to place reading materials and more lighting is always good."

“Instead of a table, a lamp would be a better inclusion.”

“This design is a funky mix, not sure what's really going on. It is not a clear theme.”

“Carpet in the library is lit.”

Figure 33 Proposal 2 for space 4

In this proposal, a lantern was used between the chairs. The pattern on the column was inspired by Korean architecture. To complement the color used on column, chairs were also changed into red color and a painting of landscape was added as well.

Comments from Charrette Participants on proposal 2

Pros of this design: Painting, color of the wooden table. Cons of this design: The lamp, the color and the pattern on the panel.”

“Great aesthetic. Perhaps may use a centerpiece instead of a lamp such as a table.”

“If overhead lighting is always on, a lamp may not be needed. You could install "mood lights".”

“I like the bold red of this design.”

“I don't think lamps in both proposals are required.”

“Could possibly use overhead plants - more of a jungle theme”

“Red color on the pillar is little bit too much.”

“The space seems dark and borderline gloomy.”

Using this feedback, proposal for the third day of charrette was prepared. It is shared below.

Figure 34 Final proposal presented on Day 3 for Space 4

Both ideas from day two were merged to create a design for day three of charrette. In this proposal, Turkish rug was kept, chairs had soft ark rests. A sculpture made of boos was used in between the chairs. Column was designed by mixing two cultures as suggested by a participant of charrette above. On to opposite sides of columns Doric column design is used and on the other two sides, pattern from eastern cultures is used.

Comments from Charrette Participants on Proposal 3

“Love the east-meets-west nature of the cultures and their art. The juxtaposition and melding both resonate with me.”

“I like it and I also think something related to Latin American culture can be added”

“Like the nature-based art as well.”

“I like the pattern. I don't know if it is possible to add something to represent Latin American culture as well.”

“I really like the design on the front of the column”

“I would like to see more light coming in”

“I like the fusion of cultures on the column”

“There are a lot of patterns going on between the rug and the column. I like it, I just think it's a lot.”

“I would love to see some prints to represent the different cultures present in African countries as well.”

5.3.5 Space 5

Space 5 is a blank partition wall on the left side while entering from the north entrance of the library.

Figure 35 Partition Wall While Entering through North Entrance of the MSU Library

Participants gave following design ideas for this space.

Art

“Make the panels look like windows into different parts of the world.”

“Paint this Bin in Mexican Style patterns. “

“May be paint a longitudinal picture of an immigration in history”

“Create a unity mural.”

Using this feedback, two proposals were created for day two of charrette. These are shared below.

Figure 36 Proposal 1 for space 5

In this potion, windows into the world idea was used. Pictures of different cultures or landmarks from around the world will be displayed in these three niches. Also, the dustbin is painted in a Mexican inspired pattern.

Comments from Charrette Participants on proposal 1

"I like both, but a changing exhibit every month would be great too celebrating different cultures."

"I love love this. It would be good to have the pictures change often to represent several cultures."

"Keeping in mind logistics, this is where people come and go."

"I like the design on the canister."

"Maybe a window can have a view into the great sphynx and pyramids so Africa can have representation"

"I like the window to the world idea of this."

Figure 37 Proposal 2 for space 5

In this proposal, a timeline of clack history is used with black background on the partition wall. The dustbin is also painted in African inspired pattern.

Comments from Charrette Participants on proposal 2

"While I like the timeline, since this is a transitory space, I think it would be better served where people can stop and take it in or make a timeline that is more graphic and representational in nature."

"I like this one more. The dark wall behind the poster seems to be standing out. I feel it will look better if that can be changed."

"There are many other posters across the MSU buildings with similar content. But not so many about other countries and cultures. That is why I like the second one"

Using this feedback, a proposal for the third day of charrette was designed. It is shared below.

Figure 38 Final proposal presented on Day 3 for Space 5

Since a lot of participants preferred the ides with the concept of windows into the world, that was used for the last day of charrette. A frame was added to each niche to give better impression of windows. The comments provided by participants on the third proposal are shared below.

Comments from Charrette Participants on Proposal 3

“It is cool to add "natural sceneries" from different places as well, in addition to buildings.”

“I think this is phenomenal. I love the idea of the "windows"”

“I’m concerned with the pattern and eye strain on the dustbin. It doesn't quite jive with the views to me.”

“Maybe work with the LEAF Club to theme the bins in environmentally friendly in primary colors, blue and green especially”

“I love the windows of the world artwork, especially how they are interchangeable.”

“I wonder if we could turn this into submissions/"contest" from artists around the world or students on campus to really connect to them. Then we could use a QR code or interpretive sign about the country/culture/artist.”

“A way "contradicting" the policing that is happening with the metal detectors.”

“I love the Window-to-the-World idea and rotating artwork. It would be great to theme it with themed months for example, Earth Day artwork. “

5.3.6 Space 6

Space 6 is the welcome sign and book drop off area near the south entrance of the library. It is shown in Figure 39.

Figure 39 Welcome Sign After Entering Through South Entrance of the MSU Library

Charrette participants gave several design suggestions regarding the design of this space to enhance multiculturalism. Their suggestions are shared below.

Art	“Show history of books here. May be hang a copy of the following painting "The Book of the Dead of Hunefer, c. 1275 BC, ink and pigments on papyrus, in the British Museum". Papyrus was one of the first techniques.”
	“This paper welcome poster can be replaced with an electronic one. It can have a slideshow of pictures from different countries.”
	“This sign is very old. It needs to be refreshed. But it is very popular with

	visitors, and they take pictures next to it a lot.”
	“Have a picture of someone, preferably a cartoon figure pointing to the Dropbox sign.”
Interior Color	“Change the color of the door to a lighter feel. maybe more pastel beige. The current one is heavy”
Interior	“Let’s move to a "wood" floor. That carpet pattern can be dizzying.”
textures/patterns	“Also, people slip and fall in the winter. Lots of slush gets tracked in. Walk off carpet is more durable and slip proof. “

Using these design suggestions provided by charrette participants, following two design proposals were created for day two of charrette.

Figure 40 Proposal 1 for space 6

In this proposal, a copy of the painting "The Book of the Dead of Hunefer, c. 1275 BC, ink and pigments on papyrus, in the British Museum" was hung over the book drop off slit. The welcome banner was kept as suggested by several participants on day one.

Comments from Charrette Participants on proposal 1

“Like the picture in this slide better, the historical nature of the picture - speaks more of a library.”

“I like that this represents African culture.”

“The illuminated book drop is awesome.”

“Turn book drop into ankh from Egyptian history to complement the painting.”

“African culture isn't represented on campus, so this is very nice”

“I like the more uniform carpet; it doesn't take attention away from anything else and isn't dizzying.”

Figure 41 Proposal 2 for space 6

In this proposal, a copy of the painting "The Book of the Dead of Hunefer, c. 1275 BC, ink and pigments on papyrus, in the British Museum" was hung over the book drop off slit. The welcome banner was kept as suggested by several participants on day one.

Comments from Charrette Participants on proposal 2

“Like the idea of digital graphics due to ease of updating, scrolling, etc. “

“The electronic screen here seems to be a hindrance for people who will come to drop books. I would not want to be inches away from the screen while dropping a book.

Perhaps make the screen smaller.”

“I like this one. I like the Sparty's head drop box. However, I think the welcome sign is too big. Maybe reduce the width.”

“It is difficult to find the slot because of the design.”

“The book into the helmet is not a good idea.”

“Screen could also list daily events happening at the library for the day.”

“Flat screen monitor can also change messages depending on what is celebrated: AAPI Month, Black History Month, LatinX Month, etc.”

“It can also show the names and photos of the most prominent authors from the different countries in their home language.”

Using this feedback, a third option was developed for the third day of charrette. It is shared below.

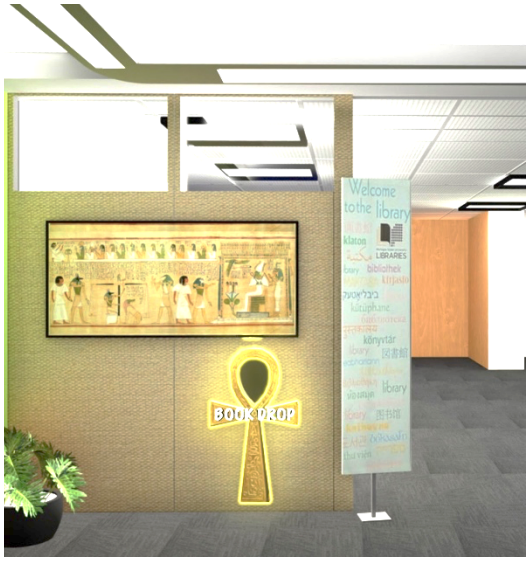

Figure 42 Final proposal presented on Day 3 for Space 6

In this proposal, the painting was kept as it was appreciated by a lot of participants. “Ankh” a historic symbol from Egyptian history was used to complement the painting. Due to the popular nature of the welcome sign, it was kept in this proposal. The comments provided by participants on the proposal presented on day 3 of the charrette are presented below.

Comments from Charrette Participants on Proposal 3

“I'd love to see more South African and West African influences as well, since a lot of African imagery in the West comes from North African and East Africa.”

“African culture is not represented at all on campus, so this is extremely inclusive and nice!”

“I love the ankh idea but [or should I say and!] the opening can be much bigger to accommodate larger books!”

“Love the artwork, I wonder if there is a way to mount the sign on the wall, so it is not floating out on the stand”.

“I like that the welcome sign is kept”.

“I like it but I am not sure about the textbook drop box”.

Chapter 6
Discussion and Implications

This study employed Astin I-E-O model (1993) to develop theoretical framework. Some of the findings of this study follow the results of previous studies that used this model. The detail findings are discussed below.

6.1 Student Characteristics and their Perceived Diversity Support by Campus Design Elements

The relationship between student characteristics (age, gender, ethnicity, status as domestic or international student and their interaction with diverse people inside and outside college) and their perceived diversity support by campus design elements was examined in this study. The findings indicate that there exists statistically significant relationship between some of the independent variables and dependent variables. This also follows the proposition of Astin's I-E-O model i.e., inputs which are student characteristics have a significant relationship with the environment which in this case are campus physical design elements.

This study found statistically significant relationship between age groups and perceived diversity support of campus design elements by students. There have been mixed findings regarding age as it relates to perception in previous studies. For example, Yildirim et al. (2007) and Jowkar et al. (2020) found no difference in the perception of office planning and perception of thermal comfort of a space with age respectively. However, others found age related differences in perception (Schweiker, et al. 2018; Rupp et al. 2015; Wang et al. 2018). The current study shows that students with age 18 to 25 years reported highest perceived diversity support for majority of campus design elements. This might be because majority of the students who responded to the survey falls in this age range. Also, majority of the students doing

undergraduate also falls in this age range. These students could have spent more time to experience the environment. Whereas students with ages more than 25 years could be graduate students who yet have to spend more time on campus to answer questions regarding perception of campus environment.

The relationship between gender and perception of campus design elements compliments the findings of previous studies (Yildirim et a. 2007; Anjum et al. 2005). No significant relationship was found between gender of students and perceived diversity support by campus design elements. The study also found significant relationship between ethnicity and some of the campus design elements i.e., art, signage and graffiti. Although significant relationship is not found between all campus design elements, but the findings are in line with some of the previous studies that found relationship between ethnicity and perception (Chen and Zhao, 2006; Pantouvakis & Renzi, 2016). White students reported the highest mean for perceived diversity support by art, signage and graffiti. This could be because being a majority, white students might perceive even the slightest support of diversity enough.

The study also found no significant relationship between nationality of students and their perceived diversity support by campus design elements. The interaction of students with diverse people within campus showed significant relationship with their perceived diversity support by campus art. Also, significant relationship between interaction of students with diverse people outside campus and their perceived diversity support of campus art, architecture, interior design of buildings and landscape design was also found. Previous study also found that there is a significant relationship between students' interaction with diverse people on campus through participation in social activities and their perceived diversity support by campus environment (Cheng & Zhao, 2006). The interaction of students with diverse people on daily basis might

make students more sensitive towards perceiving diversity support by campus physical design elements leading towards these results.

These results indicate that student characteristics have a potential to impact their perception of campus environment. Students do perceive campus physical environment through cultural lenses and that perception can be different from the intention of college campus planners and administration. The findings of this study also highlight those campuses can use student characteristics and their relationship with perception as a tool to design physical environment in a way to achieve their goals such as promote multiculturalism and enhance multicultural competencies among students.

6.2 Student Characteristics and their Multicultural Competencies

Student characteristics i.e., age, gender, ethnicity, nationality and their interactions with diverse people within and outside campus were included in this study to examine their relationship with students 'multicultural competency. Previous studies showed a negative correlation of age with learning outcomes (Strayhorn, 2008) whereas in this study no significant difference in multicultural competency of students was found based on age. As different students on campus bring different experiences with them, for example some coming from minority groups, some from different part of the world and some having study abroad experiences. This could have significantly impacted their multicultural competencies making age having no significant or very minute relationship with their multicultural competencies.

The significant difference found in multicultural competencies of male and female students was in line with previous studies where female tend to have higher outcomes than male counterparts (Strayhorn, 2008; King & Howard-Hamilton, 2003, AUSSE, 2010b). The study found significant differences in multicultural competencies of students based on their ethnicities

like previous studies (Ivers, 2012; King & Howard-Hamilton, 2003). Minority students had higher mean multicultural competencies than majority students. Blacks/African American had highest multicultural competencies followed by Hispanic students, followed by Native Hawaiian students followed by Asians, and then white students. The reason for this trend might be that minority students face biases and discrimination which makes them sensitive towards other ethnicities and hence resulting in their higher multicultural competencies than majority students.

Cheng and Zhao (2006) didn't find a relationship between nationality and multicultural competency gains of students, however in this study, a significant difference has been found in the multicultural competencies of domestic students and international students. Domestic students reported higher mean multicultural competencies than international students. Also, interaction with diverse people within and outside campus are also found to be significantly related to multicultural competencies of students. King and Howard-Hamilton (2003) also found in a focus group study that students stated interest in diverse interactions as they thought it would help them enhance their multicultural competencies. This study found that there does exist a difference in multicultural competencies of students based on their interaction with diverse people, both inside and outside campus highlighting the findings of King and Howard-Hamilton (2003).

6.3 Students' Perceived Diversity Support by Campus Design Elements and their Multicultural Competencies

This study shows that there is significant correlation between perceived diversity support of different campus design elements and multicultural competencies of students. Previous studies found a relationship between social environment of campus and student's multicultural competencies (Cheng & Zhao, 2006). In addition to social environment, literature also discussed

the relationship between physical environment of campus and multicultural competencies (Banning & Bartels, 1997; Strange & Bannings, 2015). Present study provides evidence that the perceived diversity support of all physical design elements is significantly correlated with multicultural competency gains of students.

Regression analysis was also run between perceived diversity support by each campus design element by students and their multicultural competency gains. The results shows that there is a significant relationship between student's perceived diversity of each campus design element and their multicultural competency. This finding also compliments Astin's I-E-O model which shows that environment of campus has a relationship with student gains. In this case, perceived diversity support of campus design elements is found to have a relationship with multicultural competencies of students.

6.4 Design Guidelines for Campus Physical Design Elements to enhance Multicultural Competencies of Students

After examining the quantitative data and finding out evidence of relationship between campus physical design elements and multicultural competencies of students, the characteristics of these design elements were explored. Qualitative data was collected using a design charrette from different members of campus community regarding design of campus physical environment that can enhance multiculturalism on college and multicultural competencies among students. Design charrette was used for collecting qualitative data because charrettes are the best way to get the most creative proposals in the shortest period of time (Kelbaugh, 2001). Design elements i.e., art, signage and interior design were explored in a three-day charrette in which different members of MSU community i.e., students, people who work in the library, designers etc. participated. Participants gave several ideas regarding the design of these elements that could

contribute towards multiculturalism on campus and enhance multicultural competencies of students. Based on the feedback of charrette participants, some of the major design characteristics of campus design elements i.e., art signage and interior design that can enhance multiculturalism on campus and multicultural competencies of students are discussed below:

6.4.1 Art

Art includes paintings, posters, photographs, and statue on campus. The design of art to enhance campus multiculturalism should include:

- Art should reflect cultures and personalities from different parts of the world especially from minority cultures.
- Art should also include natural scenes as a lot of people can relate to nature.
- Art i.e., posters and photographs should have pictures and recopies of food from around the world.
- Art pieces can be big in size and digital to promote user interaction.
- Statues should be of large size so that people can interact with them and statues of important personalities from around the world along with their description should be placed on campus.

6.4.2 Interior Design

Interior design includes interior colors, interior texture/patterns, and interior lighting. Interior design of campus buildings can enhance multiculturalism through:

- Interior colors should reflect different cultures and also nature should be included in the interior spaces to add color.
- Mixed interior lights (cool and warm) should be used with cultural lights from around the world.

- Natural light should be introduced in the spaces through design in different ways.
- Cultural textures and patterns from around the world along with natural textures and patterns should be used in the interior spaces.

6.4.3 Signage

Signage includes official, unofficial, and illegitimate signs on campus. The design of signage should have following characteristics to enhance multiculturalism:

- Signage should be provided in multiple languages including symbology as symbology is universal in nature and is understood by a lot of people.
- Different cultures should be represented in signage design through use of cultural patterns and colors.
- Use of lights can be utilized to add patterns and colors in signage to reflect different cultures and countries.

These design characteristics can act as a guideline for designers and college administration while designing campus for multiculturalism and targeting physical design of campus to improve multicultural competencies of students.

6.5 Implications

This study contributed to the body of knowledge by utilizing Astin's I-E-O model. This model has been used previously to examine the relationship between campus social environment and multicultural competencies of students but has not been used to examine the relationship between campus physical environment and multicultural competencies of students. Utilizing this model in this study and the findings of the study provides evidence of support for this model to be used in future for physical environment studies as well.

Before this study, there existed a gap in literature regarding studies relating physical environment of campus and multicultural competencies of students. This study provides evidence that physical environment of colleges has significant relationship with multicultural competencies of students and campus multiculturalism.

U.S. colleges devote a lot of resources towards creating programs and policies to make diverse students feel welcomed and have a sense of belonging. This study highlights that in addition to social environment, physical environment that students experience while at an institution also has potential to contribute towards colleges' goal to reflect multiculturalism. Especially art which includes paintings, posters, statues, and photographs have the highest significance towards creating multicultural competencies in students attending these colleges.

Previous studies either used quantitative approach or qualitative approach to examine multicultural competencies. This study adopted mixed methods to examine the relationship between physical environment of campus and multicultural competencies of students.

This study also had a huge sample size of 2975 participants to examine the relationship between physical environment of campus and multicultural competencies of students. In addition to providing evidence of relationship between different variables, another important contribution of this study is the characteristics of campus design elements that can enhance campus multiculturalism which was gathered from different members of a campus community. These design characteristics can be used for guidance while taking decisions about campus physical environment especially with regards to enhancing multiculturalism on campus.

Chapter 7
Conclusion and Future Recommendations

7.1 Conclusion

Education institutions introduce several initiatives to develop and enhance multiculturalism on campuses and multicultural competencies among students. This is to make diverse students coming to campuses feel welcomed and to better prepare each student to work effectively with others who are culturally different.

The conclusion of the study addresses that among several other college initiatives, physical environment of college campus also has a tendency to impact multicultural competencies of students. However, due to limited studies in this area, current study aimed at examining this relationship. The purpose of this study was to examine the relationship between perceived diversity support by physical design elements of campus i.e., art, signage, architecture, interior design, landscape design and graffiti on campus with multicultural competencies of students.

Astin I-E-O model (1993) was utilized to develop conceptual framework of the study. This model has been widely used for college impact studies and have been used extensively to examine the relationship between various college initiatives, such as course curriculum, teaching modes, social environment of college etc. and student's learning outcomes. However, its application has not been explored enough to examine the relationship between campus physical environment, and students' learning outcomes or competency development. Therefore, this study adopted this model to examine the relationship between campus physical design elements and multicultural competencies of students.

Total of 2975 responses were analyzed to examine this relationship. Multiple regression analysis was performed, and significant relationship was found between perceived diversity support by campus art and architecture with multicultural competencies of students. Filling up the gap in literature, these findings prove the relationship between perceived diversity support of campus physical design elements by students and their multicultural competency. In addition to this relationship, the findings of the survey also revealed significant relationships between several student characteristics and their perceived diversity support by campus physical design elements. Also, significant relationships were found between several student characteristics and their multicultural competencies. These findings make a theoretical contribution in literature as they follow the proposition of Astin I-E-O model which states that:

1. Inputs of students i.e., student characteristics have a relationship with the environment i.e., perceived diversity support by campus physical design elements.
2. Inputs of students i.e., student characteristics have a relationship with the outputs i.e., multicultural competencies.
3. Environment i.e., perceived diversity support by campus physical design elements has a relationship with outputs i.e., multicultural competencies of students.

After examining this relationship, the characteristics of campus physical design elements i.e, art, interior design and signage were further explored in a three-day design charrette as charrettes are the best way to get the most creative proposals in the shortest period of time. Main library lobby of MSU was redesigned with the help of the feedback of charrette participants. Different community members of MSU i.e., students, people working in the main library, designers and construction management professionals participated in the design charrette. The guidelines regarding the design of campus to reflect multiculturalism collected during charrette as shared in

chapter 6 can guide designers and college administrations while taking decisions regarding campus physical design to enhance multiculturalism and multicultural competencies of students.

7.2 Limitations and suggestions for Future Research

Several limitations exist in this study. The university selected to gather data to examine the relationship between campus physical environment and multicultural competencies of students was a mid-western land grant university. It is not a representation of all the universities and therefore generalization of the research results should be carefully considered. Similar studies can be conducted in different universities having varied composition of student population to examine the relationship between physical environment and multicultural competencies of students.

The second limitation of the study is about the student survey that was used to collect data. Limited questions about the characteristics of physical design elements of campus were included to keep the length of the survey with in 10-15 minutes. Future studies can include detail questions about each of the design element of physical environment on campus to examine these relationships.

Third limitation of the study is regarding design charrette. Online design charrette was conducted for the study and 29 participants took part in it over the course of three days. In person design charrette and having more participants would have provided with more characteristics of physical design element to represent multiculturalism. Future studies can plan an in-person design charrette with different members of the college campus to have detailed face to face discussions regarding design details. If online design charrette is preferred, then more than one rounds of charrette should be planned to have a greater number of participants.

Fourth limitation of the study is regarding the proposals presented in the study. Although a lot of ideas were shared by participants and incorporated in the proposals developed for each space, but the designs of each space varied a lot. Generally, an interior of a building follows certain color scheme or theme. So many different ideas and colors used in the proposals developed in this study might not be something a designer would be comfortable doing. Therefore, in future, while redesigning a space, entire area can be included to see how the design ideas complemented each other in the building.

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APPENDIX

Survey Instrument

MICHIGAN STATE
UNIVERSITY

EXEMPT DETERMINATION
Revised Common Rule

December 28, 2020

To: Eunsil Lee

Re: **MSU Study ID:** STUDY00005501
Principal Investigator: Eunsil Lee
Category: Exempt 2ii
Exempt Determination Date: 12/28/2020
Limited IRB Review: Not Required.

Title: Relationship between Campus Physical Environment and Multicultural Competencies of Students

This study has been determined to be exempt under 45 CFR 46.104(d) 2ii.

Principal Investigator (PI) Responsibilities: The PI assumes the responsibilities for the protection of human subjects in this study as outlined in Human Research Protection Program (HRPP) Manual Section 8-1, Exemptions.

Institutional restrictions to in-person human subject research activities conducted by MSU employees, MSU students, or agents of MSU are in place, but MSU is phasing in human research that has the potential for in-person interactions with participants, using a Tier approach. Restrictions to in-person interactions with human research participants by MSU employees, MSU students, or agents of MSU are in place until the activity is permitted under a Tier and a Human Research Plan for a Safe Return is approved. Visit http://hrpp.msu.edu/COVID-19/index.html for the restrictions, Tiers, forms, and the process.

Continuing Review: Exempt studies do not need to be renewed.

Modifications: In general, investigators are not required to submit changes to the Michigan State University (MSU) Institutional Review Board (IRB) once a research study is designated as exempt as long as those changes do not affect the exempt category or criteria for exempt determination (changing from exempt status to expedited or full review, changing exempt category) or that may substantially change the focus of the research study such as a change in hypothesis or study design. See HRPP Manual Section 8-1, Exemptions, for examples. If the study is modified to add additional sites for the research, please note that you may not begin the research at those sites until you receive the appropriate approvals/permissions from the sites.

Please contact the HRPP office if you have any questions about whether a change must be submitted for IRB review and approval.

Office of Regulatory Affairs
Human Research Protection Program

4000 Collins Road
Suite 136
Lansing, MI 48910

517-355-2180
Fax: 517-432-4503
Email: irb@msu.edu
www.hrpp.msu.edu

Campus Physical Environment and Multicultural Competencies of Students

Consent

You are invited to participate in a survey that will take approximately 10-15 minutes and will ask questions about your perception regarding Campus design of Michigan State University, your Multicultural Competencies and demographics. This survey is for a research study exploring relationship between campus design elements and multicultural competencies of students. You must be at least 18-year-old to participate in this research. **YOUR RIGHTS TO PARTICIPATE**Participation in this survey is completely voluntary. You have the right to say no. You may change your mind at any time and withdraw. You may choose not to answer specific questions or to stop participating at any time. **COMPENSATION FOR BEING IN THE STUDY**50 participants will be randomly selected and will receive a $10 Amazon gift card each.To select these 50 participants, everyone will be divided into 50 groups having approximately equal no. of participants, and one person will be selected from each group to receive the gift cards. This will be done so that each person will have equal opportunity to win the gift card. The draw will happen exactly two weeks after the first survey email sent out to students.To receive the gift card, don't forget to leave your email address at the end of the survey. **CONTACT INFORMATION FOR QUESTIONS AND CONCERNS**If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact the Rabia Faizan at 517-348-5938, email at faizanra@msu.edu or mailing address: 1270 Garden City Road, Apt. 130, East Lansing, Michigan, 48823 OR Eunsil Lee at 517-432-3249, email at leeeunsi@msu.edu or mailing address: Human Ecology Building 552 W. Circle Drive, Room 201L, East Lansing, Mi, 48824.If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 4000 Collins Rd, Suite 136, Lansing, MI 48910. By clicking on the button below, you indicate your voluntary agreement to participate in this online survey.

Please rank your level of agreement with the following statements (1=Strongly Disagree and 5=Strongly Agree)

The MSU campus represents diverse cultures through:

	1	2	3	4	5
Art such as painting, poster, photograph, statuary (1)	○	○	○	○	○
Signage including official, and unofficial signs (2)	○	○	○	○	○
The exterior architectural design of buildings (3)	○	○	○	○	○
The interior design of buildings (13)	○	○	○	○	○
The landscape on campus (15)	○	○	○	○	○
The graffiti (chalked, scratched, scribbled, or sprayed) across campus (16)	○	○	○	○	○

The MSU campus encourages positive understanding among different cultural communities through:

	1	2	3	4	5
Art such as painting, poster, photograph, statuary (1)	○	○	○	○	○
Signage including official, and unofficial signs (2)	○	○	○	○	○
The exterior architectural design of buildings (3)	○	○	○	○	○
The interior design of buildings (4)	○	○	○	○	○
The landscape on campus (5)	○	○	○	○	○
The graffiti (chalked, scratched, scribbled, or sprayed) across campus (6)	○	○	○	○	○

My ability to understand people of different cultural groups has improved because of my experience with the following aspects of MSU campus.

	1	2	3	4	5
Art such as painting, poster, photograph, statuary (1)	○	○	○	○	○

Signage including official, and unofficial signs (2)	○	○	○	○	○
The exterior architectural design of buildings (3)	○	○	○	○	○
The interior design of buildings (4)	○	○	○	○	○
The landscape on campus (5)	○	○	○	○	○
The graffiti (chalked, scratched, scribbled, or sprayed) across campus (6)	○	○	○	○	○

The MSU campus environment helps me explore issues of diversity through:

	1	2	3	4	5
Art such as painting, poster, photograph, statuary (1)	○	○	○	○	○
Signage including official, unofficial, and illegitimate signs (2)	○	○	○	○	○
The exterior architectural design of buildings (3)	○	○	○	○	○
The interior design of buildings (4)	○	○	○	○	○
The landscape on campus (5)	○	○	○	○	○
The graffiti (chalked, scratched, scribbled, or sprayed) across campus (6)	○	○	○	○	○

Q6 Did you visit any of the following buildings on MSU campus before COVID hit?

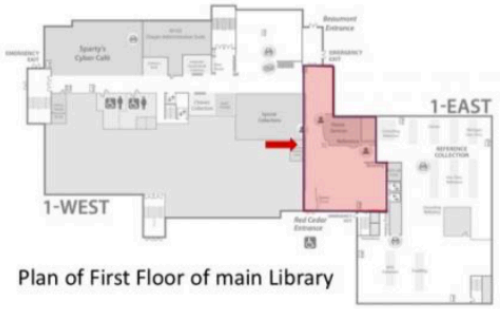
- ○ Main Library
- ○ International Center
- ○ Union building
- ○ Never been to any of the following buildings

Q7 How often were you visiting the main library?

- ○ Daily
- ○ Weekly
- ○ Monthly

○ Less often

Please take a look at the photos below and answer question 9. (1=Strongly Disagree and 5=Strongly Agree)



Plan of First Floor of main Library

Please answer the question below for the Highlighted section of the library

The main library represents diverse cultures through:

	1	2	3	4	5
Architectural form of the building (1)	○	○	○	○	○
Interior space design (2)	○	○	○	○	○
Colors of interior space (3)	○	○	○	○	○

Interior lighting condition (4)	○	○	○	○	○
Textures of interior finishing materials (e.g. floor, wall or furniture finishes). (5)	○	○	○	○	○
Pattern of interior surfaces (e.g. floor, wall, ceiling or furniture) (6)	○	○	○	○	○
Signage (official signs, and unofficial signs) (7)	○	○	○	○	○
Paintings inside the building (8)	○	○	○	○	○
Posters (Drawings or prints) in the building (9)	○	○	○	○	○

Would you like to add any details about any of the above-mentioned design elements and why you think it represents diversity.

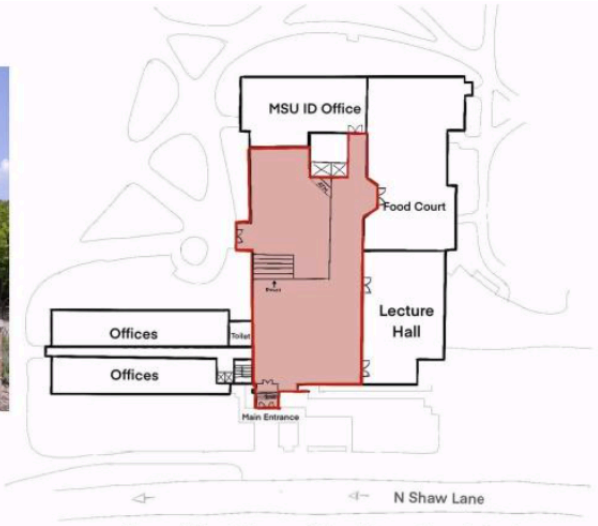
_____

_____

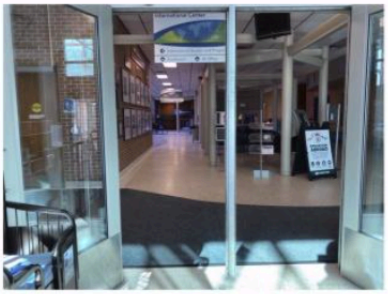
Q11 How often were you visiting the International Center?

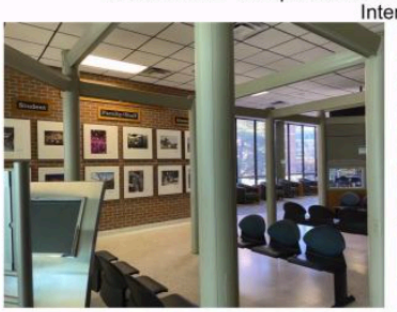
- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Less Often

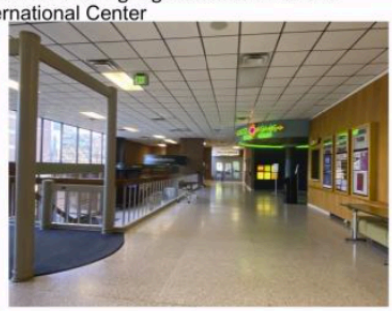
Please take a look at the photos below and answer question 13.(1=Strongly Disagree and 5=Strongly Agree)

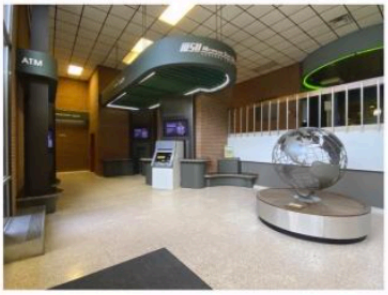


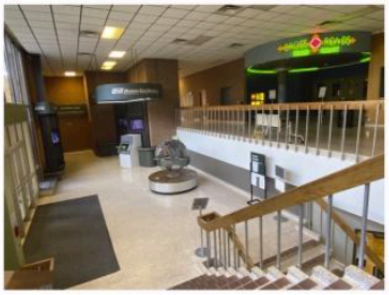
Plan of First Floor of the International Center
Please answer the question below for the Highlighted section of the International Center

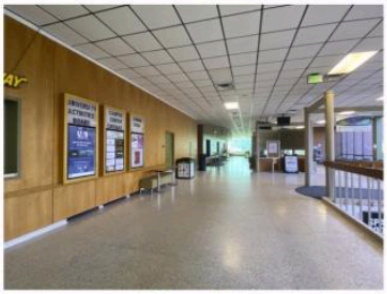












The International Center represents diverse cultures through:

	1	2	3	4	5
Architectural form of the building (1)	○	○	○	○	○
Interior Space design (2)	○	○	○	○	○
Colors of interior space (3)	○	○	○	○	○

Interior lighting condition (4)	○	○	○	○	○
Textures of interior finishing materials (e.g. floor, wall or furniture finishes). (5)	○	○	○	○	○
Pattern of interior surfaces (e.g. floor, wall, ceiling or furniture) (6)	○	○	○	○	○
Signage (official signs, and unofficial signs) (7)	○	○	○	○	○
Photographs inside the building (8)	○	○	○	○	○
Posters (Drawings or prints) in the building (9)	○	○	○	○	○
Statuary (10)	○	○	○	○	○

Would you like to add any details about any of the above-mentioned design elements and why you think it represents diversity.

_____

_____

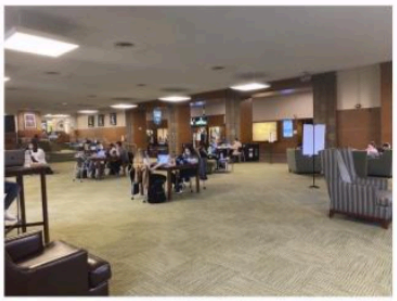
Q15 How often were you visiting the Union Building?

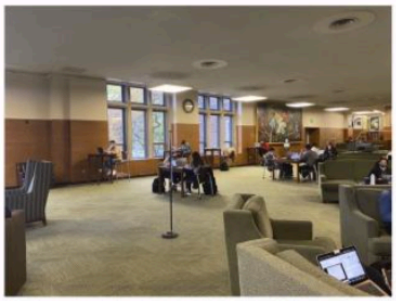
- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Less Often

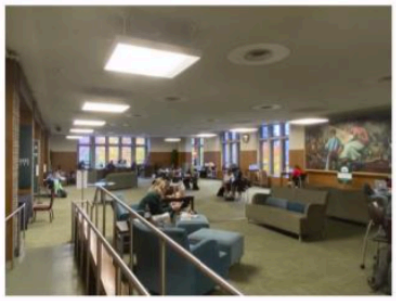
Please take a look at the photos below and answer question 17.(1=Strongly Disagree and 5=Strongly Agree)

Plan of First Floor of the Union Building

Please answer the question below for the highlighted section of the Union building







The Union Building represents diverse cultures through:

	1	2	3	4	5
Architectural form of the building (1)	○	○	○	○	○
Interior Space design (2)	○	○	○	○	○
Colors of interior space (3)	○	○	○	○	○
Interior lighting condition (4)	○	○	○	○	○

Textures of interior finishing materials (e.g. floor, wall or furniture finishes). (5)	○	○	○	○	○
Pattern of interior surfaces (e.g. floor, wall, ceiling or furniture) (6)	○	○	○	○	○
Signage (official signs, and unofficial signs) (7)	○	○	○	○	○
Paintings inside the building (8)	○	○	○	○	○
Posters (Drawings or prints) in the building (9)	○	○	○	○	○

Would you like to add any details about any of the above-mentioned design elements and why you think it represents diversity.

_____

_____

What comes to your mind when you hear the word "Multiculturalism"?

_____

_____

What comes to your mind when you hear the word "Diversity"?

_____

_____

At this time in your life, how would you rate yourself in terms of the following.

	Very limited (1)	Limited (2)	Good (3)	Very Good (4)
Understanding how my cultural background has influenced the way I think and act. (1)	○	○	○	○
Understanding of the impact of the way I interact with people of different cultural backgrounds. (2)	○	○	○	○
My ability to accurately compare my own cultural perspective with that of someone from another culture. (3)	○	○	○	○
My understanding of the term "Culture". (4)	○	○	○	○

My understanding of the term "Ethnicity". (5)	○	○	○	○
My understanding of the term "Racism". (6)	○	○	○	○
My understanding of the term "Prejudice". (7)	○	○	○	○
My ability to communicate with a person from a cultural background significantly different than my own. (8)	○	○	○	○
My ability to effectively deal with biases, discrimination, and prejudices directed at me. (9)	○	○	○	○
My ability to accurately identify culturally biased assumptions. (10)	○	○	○	○

Q22 Please select your level of agreement with the following.

	Strongly disagree (1)	Disagree (2)	Somewhat agree (3)	Agree (4)
Ambiguity and stress often result from multicultural situations because people are not sure what to expect from each other. (1)	○	○	○	○

Your Age?

- ○ less than 18 years
- ○ 18-20
- ○ 21-25 years
- ○ 26-30 years
- ○ 31-35 years
- ○ 36-40 years
- ○ More then 40 years

Your Gender?

- ○ Male
- ○ Female
- ○ Transgender Male
- ○ Transgender Female

- ○ Gender variant/ non confirming
- ○ Other
- ○ Prefer not to answer

Please specify if selected other?

_____

Your ethnic or cultural group you consider yourself a member of? Please check all that apply.

- ○ American Indian or Alaska Native
- ○ Asian
- ○ Black or African American
- ○ Hispanic or Latino
- ○ Native Hawaiian or Pacific Islander
- ○ White
- ○ Other

Please specify if selected other?

_____

What is your cumulative GPA?

- ○ Below 2
- ○ 2.01-2.50
- ○ 2.51-3.00
- ○ 3.01-3.50
- ○ 3.51-4.00

What is your status at college?

- ○ Freshman

- ○ Sophomore
- ○ Senior
- ○ Masters student
- ○ Ph.D. student
- ○ Post Doc.

Please specify if selected other?

_____

How many years have you spent on this campus?

- ○ Less than 1 year
- ○ 1-2 years
- ○ 2-3 years
- ○ 3-4 years
- ○ 4-5 years
- ○ 5-6 years
- ○ More than 6 years

What is your status as student?

- ○ Domestic Student
- ○ International Student

If International student, which country do you belong to?

_____

How many years have you spent in the U.S.?

- ○ Less than 1 year
- ○ 1-2 years
- ○ 2-3 years
- ○ 3-4 years

- ○ 4-5 years
- ○ 5-6 years
- ○ More than 6 years

How often do you interact with people from different culture than your own in college setting?

- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Once in two months
- ○ Yearly

How often do you interact with people from different culture than your own outside of college?

- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Once in two months
- ○ Yearly

During you time at MSU, have you participated in any college activity group (i.e., sororities, fraternities, student organizations, student government bodies, clubs or other student groups)?

- ○ Participated
- ○ Was an active member
- ○ Played a leadership role
- ○ Never participated

Will you be residing in the state of Michigan during spring 2021?

- ○ Yes
- ○ No

○ Not sure

Please leave your email address to receive a $10 Amazon gift card for taking part in this study. 50 winners will be randomly selected from the participation pool.

_____

Would you like to take part in Phase II of this study and get a chance to win a $25 Amazon gift card. Phase II of this study is a participatory design. One of the campus spaces included in this survey will be redesigned with the help of your feedback and feedback of other participants.20 students who will participate Phase II will get a $25 Amazon gift card.

○ Yes

○ No