Conceptualization of Diversity in Education

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Abstract
Diversity, an important issue in higher education admission policy and practice, is addressed in this paper in terms of the construct's conceptualization and measurement. Several measures of diversity are identified, and a commonly-used demographic measure based on racial classification is examined. Differences among undergraduate students' diversity seeking behavior associated with living and learning is compared against racial classifications. A lack of correspondence between demographic and behavioral measures of diversity suggests a need for more robust multidimensional measures of the concept.

Introduction
Indiana poet James Whitcomb Riley is often credited with the expression, "When I see a bird that walks like a duck and swims like a duck and quacks like a duck, I call that bird a duck." (Helms, 2007, p. 68). Unlike identifying this amphibious bird via observable characteristics and behavior, the identification and conceptualization non-observable constructs pose a challenge for both researchers and practitioners. Such is the case with the concept of diversity and its importance in higher education admissions policy.

McDonald and Dimmick (2003) offer some concepts that either in their mathematical or conceptual formulations are common to a number of business and scientific fields. In addition to privacy (Borna and Sharma, 2011), diversity is important in the disciplines of ecology (Patel and Taillie, 1982), geography (Les and Maher, 1998), urban planning (Maly, 2000) psychology (Junge, 1994), linguistics, sociology (Agresti and Agresti, 1977), economics (Hall and Tideman, 1967), communication (Dimmick and McDonald, 2001; McDonald and Dimmick 2003), and higher education (Astin, 1993; Gurin, Nagda, and Lopez, 2004).

Beginning with efforts to enhance diversity stimulated by the civil rights movement of the 1960s and a range of public policy initiatives enacted since the late 1970s, increasing attention has continually been placed on this concept. Emphasis on diversity has pervaded both the workplace and educational institutions in the U.S. Former University of Michigan President Lee Bollinger, in explaining his institution's commitment to diversity stated:

> Diversity is not merely a desirable addition to a well-run education. It is as essential as the study of the Middle Ages, of international politics, and of Shakespeare. For our students to better understand the diverse country and world they inhabit, they must be immersed in a campus culture that allows them to study with, argue with and become friends with students who may be different from them. It broadens the mind and the intellect – essential goals of education (Rothman, Lipset, and Nevitte, 2003, p.26).

President George W. Bush further echoed this position:

> I strongly support diversity of all kinds, including racial diversity in higher education. A college education should teach respect and understanding and goodwill. And these values are strengthened when students live and learn with people from many backgrounds (Ibid., p. 26).

Regarding decades-long attention to diversity, systematic research regarding developing and implementing diversity policy and practice in higher education has been fragmented. Diversity between institutions, disciplines, and undergraduate and graduate study levels was examined in Europe with mixed findings using a variety of empirical measures including the Herfindhal index, Gini coefficient, Theil entropy, and Birnbaum measures (Widiputera, DeWitte, Groot, and Van den Brink, 2015). Other studies have explored variation in diversity measured via racial categories (Adwere-Boamah, 2013; Jones, 2013; Sirianni, 2001) and geographical differences among student subjects (Franklin, 2012). Researchers have further examined students' learning outcomes linked to variability in diversity experiences in coursework completed (Laird, 2010; Radloff, 2007), and a variety of factors including institutional social and cultural climate (Brown, 2011).

Two issues remain problematic. One issue deals with the conceptualization of the diversity concept itself. A second related matter regards operationalizing or measurement of the construct. In order to assess the outcomes of diversity practice aimed at improving policy decisions in higher education, research needs focus on both the conceptualization and measurement issues. The present investigation addresses both.

Despite the importance of the diversity concept, the construct has neither been adequately conceptualized nor operationalized within most institutions of higher education. In principle, most universities define the concept in their published material and websites by making broad references about the cultivation of inclusivity within pedagogy, scholarly, and creative pursuits and to race, religion, color, sex, sexual orientation, physical or mental disability, national origin, ancestry, age, and citizenship. In practice, however, while defining diversity in these broad terms, the assessment of diversity progress related to learning outcomes often relies narrowly on a small set of observable demographics including race, sex, and age. Our research suggests that most universities monitor and publish demographic characteristics often limited to race, and do not utilize a comprehensive operational measure in assessing learning outcomes. Without such measures, it is impossible to assess the effectiveness of existing or new diversification strategies. This study is an attempt to illustrate this problem.

Conceptualizing Diversity as a Dual Concept

Following Junge (1994), in this study we use a dual definition of the diversity concept:

> In statistical terms a measure (index) of diversity is a summary of description of a population with a class structure. More generally, quantification of diversity is related to the apportionment of some quantity (e.g., number of elements, time, or mass) into a number of well-defined classes…the complete or dual-concept type of diversity index reflects both the number of classes and the degree of evenness of the apportionment (p.16).

This definition involves two dimensions of diversity. The first dimension involves discreet categories within a given distribution such as the classification of ethnic groups or minorities. The second dimension is the frequency distribution of the elements across the categories as members of a given population, such as minority groups, might be distributed among categories. Pielou (1975) suggests the flatness of this distribution is related to the extent of diversification of elements of the population. Generally the flatter the distribution, the more diverse the population. The more skewed the distribution, the less diverse.

Universities frequently profile their student diversity in published literature by citing distributions of easily reported demographics such as race, sex, age, etc. Consistent with these metrics, Figure 1 illustrates several selected methods found in the literature to measure this dual concept of diversity. A detailed explanation of each is beyond the scope of this paper. However, the reader will note that the first group is based on proportions across categories, the second group involves logarithmic transformations, and the third group incorporates rankings.

Figure 1 http://rwahlers.iweb.bsu.edu/AEQ/Figure_1.pdf

Construct Validity: Beyond Unidimensional Measures

Regarding the alternative diversity measures identified in Figure 1, all are unidimensional in that each formulation utilizes a single population trait classification demographic, such as race. This unidimensional issue raises the question of each measure's construct validity to the extent that other salient dimensions of diversity are ignored, particularly those related to affect and behavior. Brumbaugh and Grier (2013, p. 145), noting a lack of research extending conceptualization of diversity beyond traits to a more robust treatment of the concept incorporating behavior, have developed a diversity seeking scale tapping both living and learning dimensions. Since both dimensions have relevance to education admissions policy, the diversity seeking scale has been addressed in this study.

Research Method

This study was conducted during 2015 at a large public Midwestern university with a population of approximately 22,000 undergraduate students drawn from 50 states and over 100 countries. A random sample of students was selected from the general student population as well as a sample from each of two fraternities and sororities known to be comprised of predominantly Caucasian and African American undergraduate students. These student groups were selected to force ample variation among subjects on the basis of race. Subjects were contacted by email with a survey invitation, and a questionnaire was administered electronically during the 2015 spring term. The self-administered questionnaire required subjects to classify themselves on the basis of racial category, sex, class standing, GPA range, and field of study. A response rate of 21.6 percent yielded a sample size of 136 completed returns. A detailed demographic profile of the sample is shown in Figure 2.

Figure 2 http://rwahlers.iweb.bsu.edu/AEQ/Figure_2.pdf

In this study, the diversity of each sample group was computed using Simpson's D Index, a commonly used one-dimensional demographic measure used at many universities. The Simpson's D Index equation (shown in Figure 1)

is a probability-based measure of diversity in which the index is equivalent to 1 minus the summation of each of the population's racial category's proportion squared. Proportion pi is the proportion of the ith racial category where categories equal 1 through j. Our study involved 6 racial categories identified and discussed later in this paper.

In a theoretically homogeneous, non-diverse population where all members belong to one racial category, the computed value of Simpson's D mathematically equals zero. (For example, a university enrolling all Caucasian students.) For more diverse student populations as the number of racial categories increases, Simpson's D will also increase and reach a limit of 1 in the event that population members are evenly distributed.

In addition to collecting these demographics, subjects were asked to complete a seven-item Diversity Seeking Scale developed by Brumbaugh and Grier (2013) found to measure two behavioral dimensions of diversity proneness related to living (desire to live among diverse others) and learning (desire to learn about diverse others). Items corresponding to each of these two Diversity Seeking Scale dimensions are shown in Figure 3. Each of these seven items was accompanied by a seven-point Likert scale
Figure 3 http://rwahlers.iweb.bsu.edu/AEQ/Figure_3.pdf

anchored by 1 (strongly disagree) to 7 (strongly agree). Subjects' responses to the Diversity Seeking Scale items were subjected to confirmatory factor analysis to corroborate the dimensional structure reported by the scale developers, and factor scores for each of the scale's two dimensions (living and learning) were computed for each subject.

Findings

The Simpson's D index of diversity values were computed for the population and each sample group and are shown in Figure 4. The known population index value of 0.39 was
Figure 4 http://rwahlers.iweb.bsu.edu/AEQ/Figure_4.pdf

reasonably comparable to but slightly smaller than that of the random sample from the overall population (0.48). This difference may be attributed to variation associated with the admittedly limited sample size. As shown, however, the Simpson's D diversity measure corresponding to each of the racially skewed Greek organizations was appreciably smaller demonstrated lower levels of diversity, particularly in the cases of the two predominantly Caucasian groups. As suspected, the data demonstrate measurable mathematical variation (reduction) in diversity operationalized via Simpson's D index in response to the skewed, uneven distribution across racial categories characterizing these groups.

Subjects' responses to the seven Diversity Seeking Scale items identified in Figure 3 were factor analyzed to confirm the dimensional scale structure reported by its developers (Brumbaugh and Grier 2013, p. 147). Confirmatory factor analysis using varimax rotation and an eigenvalue criterion exceeding one (Figure 5) demonstrate a comparable two-dimensional solution with all scale items loading correctly on corresponding living and learning diversity seeking dimensions consistent with findings reported by these authors.
Figure 5 http://rwahlers.iweb.bsu.edu/AEQ/Figure_5.pdf

Subjects' Diversity Seeking Scale factor scores were computed for the living and learning dimensions, and the significance of variation in these scores as measures of diversity-related behavioral proneness were examined across racial, sex, class standing, GPA, and field of study categories. A summary of these tests is included in Figure 6.
Figure 6 http://rwahlers.iweb.bsu.edu/AEQ/Figure_6.pdf
While expecting to find significant variation in the means for both the living and learning dimensions of the Diversity Seeking Scale, results were mixed. Subjects' average living component scores reflecting a desire to live among diverse others were found to be significantly different by racial category and class standing classifications but not significant in terms of sex, GPA or field of study. However, in terms of variation in mean learning dimension scores indicating a desire to learn about diverse others, statistically significant variation was found across only sexes and the field of study categories but not across racial, class standing, and GPA categories.

Since racial classification is often used by universities as a one-dimensional demographic method for illustrating student enrollment diversity consistent with variation in Simpson's D index values reported in Figure 4, we were expecting to also find significant variation across racial classifications on both Diversity Seeking Scale living and learning dimensions purportedly measuring behavioral aspects of diversity. ANOVA results illustrated significant

variation across all racial groups only in the case of the living dimension, but not in the case of learning. Hispanic/Latino and Multiracial subjects appear to exhibit the highest living dimension mean scores associated with a boundary-spanning desire to live among diverse others. However, since the ANOVA results address variation across all racial categories simultaneously and do not address pairwise differences, a Scheffe test analysis was conducted. Figure 7 contains the results of this post hoc analysis showing pairwise correlations and respective significance levels for mean Diversity Seeking Scale living and learning dimension scores for each pair of racial category groups. Interestingly, t-test results indicate that no statistically significant pairwise correlations were found on the basis of race.
Figure 7 http://rwahlers.iweb.bsu.edu/AEQ/Figure_7.pdf

Discussion
Our research found variation demonstrated across sample groups using Simpson's D Index as a demographic attribute diversity measure based on the racial classification of student subjects similarly used by universities in profiling enrollment. At the same time, little variation across groups was found for the living and learning dimensions of the Diversity Seeking Scale reflecting a behavioral measure of diversity. This raises the question of construct validity in the measurement of the diversity concept in higher education.

There is a dispute in the literature regarding the diversity concept in both business organizations and institutions of higher education. One school of thought dismisses the idea of measuring the diversity of employee or student populations based solely on their demographic characteristics, typically race. It is believed that the business managers and university administrators should focus their effort in diversifying ideas within the organization or university. Moreover, a reasonable case can be made that as long as an organization, business or educational, has "fair" and "equitable" hiring and/or admission policies, the demographic characteristics of the population of interest as a singular criterion may well be a moot issue.

This line of reasoning assumes homogeneity among individuals, whether employment candidates or college bound students regardless of ethnic backgrounds. To use a sport analogy, as long as the rules of the game are fair, anyone who finishes the race first, wins the trophy. However, in reality, individuals with diverse ethnic backgrounds, i.e., family structure, income level, language proficiency, and so on, do not start the race for employment and particularly college admission consideration from the same starting point. In higher education, prospective students from high-income family groups, who attended private schools, usually have a better chance of being admitted to universities than students without the same opportunities available to them.

There is also a sharp division among the members of the U.S. Supreme Court on the issue of diversity in higher education. According to Justice Sandra Day O'Connor, who authored the majority opinion in Grutter v. Bollinger, "student body diversity is a compelling state interest than can justify using race in university admissions." However, Justice Antonin Scalia in voicing his dissenting opinion indicated that he is not convinced educational benefits flowed from diversity as measured via demographics such as race (Grutter v. Bollinger, 2003).

This argument underscores a range of validity issues regarding the diversity construct. Two such issues are worthy of mention. Much like related diversity measurement approaches identified in Figure 1, Simpson's D Index expresses diversity as a function of the proportions of individuals existing within a set of defined classification categories. As the proportion of individuals is distributed across an increasing number of discrete classification categories (typically demographic groups), Simpson's D Index numerically decreases and theoretically approaches zero suggesting increasing heterogeneity and greater diversity of the population, be it employment in a business firm or enrollment of an education institution. The reverse is also true. As individuals of a population are distributed among decreasing numbers of classification categories, Simpson's D increases and theoretically approaches one reflecting increasing homogeneity or lack of diversity. Thus, Simpson's D index and other similar measures are mathematically sensitive to the number of classification categories used to define the population.

A second related validity issue concerns content validity, the extent to which a measure represents all facets of a given social construct. Simpson's D index scale, as a measure of diversity, mathematically reflects a unidimensional measure based on racial classification. To the extent that the construct should ideally represent a more robust, multidimensional concept, this scale may exhibit limited content validity. A unidimensional scale may lack content validity if the scale only assesses population attributes while failing to take into account the affective and/or behavioral dimension of the construct. In the context of diversity, this raises the importance of selecting

operational measures that capture the intended underlying dimensions of the concept itself. The issue is, thus, one of improved conceptualization.

Conclusions and Implications

This study examined the conceptualization and operational measurement of the diversity construct, an important enrollment policy issue facing institutions of higher education. Both Simpson's D Index, a common approach for measuring diversity using demographic categorization, and the Diversity Seeking Scale were used to examine variation in diversity across selected groups at a large Midwestern university. Findings regarding variation across groups did not agree for these alternate measures. To the extent that more robust, multidimensional measures of diversity may be more appropriate, this raises both construct and content validity measurement issues.

If one assumes that diversification of students in enrollment decisions based on their demographic characteristics is a worthwhile goal, then there is a need for an index to evaluate the effectiveness of both existing diversification strategies and the future programs or initiatives aimed at increasing the index value of diversity in institutions of higher education. The measurement methods discussed in this study can be used as a guide by higher education institutions in their efforts to achieve diversification objectives since demographic characteristics of these populations are readily available. However, research is needed to develop more robust multidimensional measurement scales of the diversity concept using both demographic and behavioral characteristics particularly related to learning outcomes. Such improved scales to operationalize diversity are sorely needed in higher education in the planning and implementation of effective admissions policies catering to increasingly diverse stakeholders.

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