



HUMAN FACTORS and ERGONOMICS SOCIETY

Assessing Authentic Diversity in the Human Factors and Ergonomics Society: An HFES White Paper

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Purpose and Potential

This paper addresses the pursuit of authentic diversity within the Human Factors and Ergonomics Society (HFES), and how this work is essential to realizing its overarching goals for inclusion and equity (HFES, 2020). This paper also seeks to invite dialogue and action within the broader HF/E professional community. Although HFES is an international organization, the HFES central office, most of its members, and its founding history are largely U.S.-based. Therefore, this paper possesses a U.S.-centric lens.

The paper begins by articulating an informal framework for authentic diversity that defines the overall concept, types of diversity, discusses benefits of authentic diversity, and considers factors that may support, threaten, or influence diversity. Through this lens of authentic diversity, three light-handed assessments of diversity in HFES are reported: (a) recent member demographics, (b) a brief history of relevant efforts in the HFES community, and (c) recent relevant scholarship in human factors and ergonomics (HF/E) that suggests a sustained interest in diversity issues. Following this review, a few discussion points on how HFES might continue to pursue authentic diversity are proffered.

The light-handed assessments focus on two concerns that are top-of-mind for many HFES members at this time: recruitment of new and diverse members (i.e., healthy growth of the Society), and retention of existing members (i.e., making HFES a rewarding academic and professional home throughout members' careers). Attending to authentic diversity speaks to both of these organizational goals. Importantly, diversity, equity, and inclusion are not new to HFES. Thus, this paper is not a "call to action" in the absence of action, nor is it a critique of valuable activities and progress to-date. Rather, this paper is a contemporary look at "who" HFES is and how HFES can continue to build toward a better future for all.

HFES has yet to publicly reflect on its own member demographics, and despite decades of work, still seems far from achieving the ideals of diversity. Indeed, that diversity and inclusion were codified as strategic goals for the Society as late as 2015 (HFES, 2020), that multiple diversity task forces were charged, a subsequent committee was established (Carayon, 2016), that there was a call to produce this paper, all indicate continuing recognition of HFES's limited progress in diversity.

Conceptualizing Authentic Diversity

Diversity broadly refers to the range of different people and perspectives represented within the membership of a group or organization. Scholarship on diversity has articulated a variety of ways that people and perspectives may differ, including several types of diversity (e.g., Duchek, Raetzke, & Scheuch, 2020; van Knippenberg, De Dreu, & Homan, 2004; van Knippenberg & Schippers, 2007). For example, *demographic diversity* refers to group membership that demonstrates range and variety across social category variables, such as race, ethnicity, gender, ability, income, and so on. This version of diversity is one of the most commonly considered when organizations discuss diversity (e.g., Bell, Villado, Lukasik, Belau, & Briggs, 2011; Guillaume, Dawson, Otake-Ebede, Woods, & West, 2017).

Another form of diversity is *functional diversity*, in which group membership includes a range and variety of information, knowledge, skills, and resources that can be applied to tasks, such a

creative problem solving, that would directly benefit from such diversity (Bunderson & Sutcliffe, 2002; A. Johnson, Nguyen, Groth, & White, 2018; van Knippenberg et al., 2004). Functional diversity is related to *experiential diversity*, in which members possess a range of backgrounds, experiences, or hobbies; and *cognitive diversity*, in which members possess a range of knowledge, expertise, or strategies. *Cultural diversity* reflects differences in ways of being and resources associated with specific communities or societies, and these differences may revolve around language, religion, race, sexual orientation, gender, age, or ethnicity (Han & Beyerlein, 2016; Stahl, Maznevski, Voigt, & Jonsen, 2010). Cultural diversity may overlap with *ideological diversity* that refers to members possessing a range of beliefs, perspectives, and approaches for understanding and characterizing the world (e.g., Olthuis & van den Oever, 2020). The above examples are not intended to be an exhaustive list of diversity types, but rather they illustrate that diversity may be conceptualized in many ways, and that people meaningfully differ on myriad dimensions.

One fundamental theme in diversity scholarship is that broadening the range and representation of members across multiple dimensions of diversity is a worthwhile goal (e.g., Bell et al., 2011; Duchek et al., 2020; Guillaume et al., 2017; Salazar, Feitosa, & Salas, 2017; Salazar, Lant, Fiore, & Salas, 2012; Stahl et al., 2010; van Knippenberg et al., 2004). When managed well, increasing functional, cognitive, and ideological diversity within an organization might lead to more robust or novel ways to conceptualize problems, solutions, and activities. Similarly, increasing demographic, cultural, and ideological diversity within an organization can enable better understanding of the organization's impact on the goals and needs of broader communities of people.

Another core finding from the aforementioned scholarship, however, is that the mere presence of diverse people (i.e., representational or compositional diversity) is no guarantee for achieving the potential benefits of diversity. Importantly, diversity must be authentic, or accompanied by legitimate feelings and experiences of belonging, worth, and participation. The people who are present must also have power, value, and agency within the organization. Collectively, this authentic experience of being a valued part of the organization is referred to as *inclusion* (Puritty et al., 2017; Roberson, 2006; Sherbin & Rashid, 2017; Shore et al., 2011; Tienda, 2013). One must also consider that opportunities for inclusion are not often equal for all organization members. Thus, authentic diversity further requires attention to *equity*, or working to ensure that peoples' different needs and resources are not barriers to inclusion.

A number of threats to authentic diversity can arise. A lack of diversity in an organization's membership and its leadership is itself a threat to authentic diversity. A sense of invisibility, isolation, or being the only representative of a group, contributes to feelings of exclusion (Robinson, O'Reilly, & Wang, 2013) and undermines a sense of belonging (Strayhorn, 2018; Waller, 2020). Similarly, a lack of diversity can communicate, regardless of intention, that an organization does not value or care about diversity. Relatedly, people who care about feeling included may not join or remain in organizations that lack clear commitment to authentic diversity. Thus, another threat occurs when organizations lack explicitly inclusive and equitable policies, rarely or never engage in activities to promote inclusion, make no effort to recruit or engage diverse perspectives, and have unclear accountability for attaining authentic diversity outcomes.

Authentic diversity requires ongoing attention to equity for people to join, stay, and participate. This may involve special tools, planning, or resources beyond the minimum required to serve a majority group. For example, many people need or benefit from closed captioning during presentations and meetings (Udo & Fels, 2010). If such needs are ignored, then people are excluded. In other words, when considerations of equity are not the default – and people must opt in to enjoy those benefits (E. J. Johnson & Goldstein, 2003) – then it simply becomes harder to include a diverse range of people.

Altogether, this brief overview lends itself to a loose framework for authentic diversity and related activities of HFES, as summarized in Figure 1. Notably, this figure does not capture potential costs of working toward authentic diversity (e.g., organizational communication, financial or human resources, individual effort or workload) – a worthwhile discussion but beyond the scope of this paper.

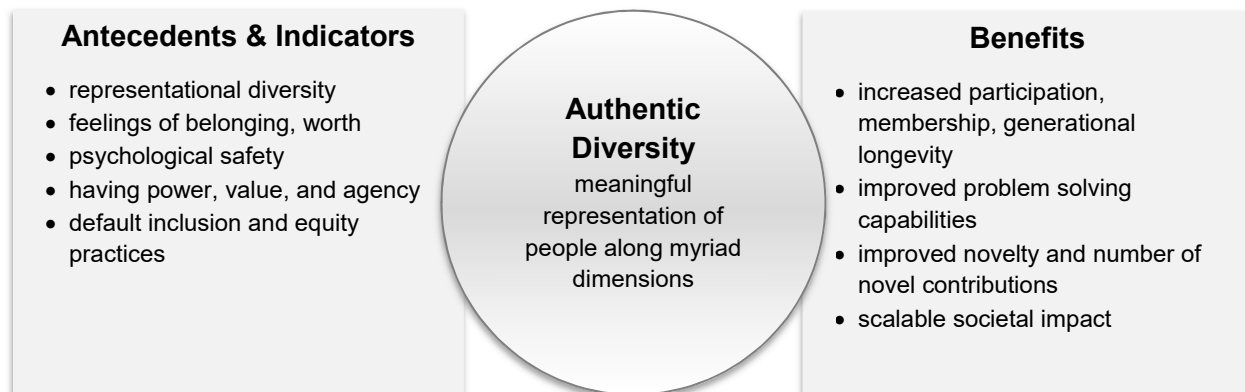


Figure 1. Toward Authentic Diversity. This figure summarizes a few antecedents to authentic diversity, within a professional networking organization such as HFES, and the possible benefits of authentic diversity, specific to a disciplinary field such as HF/E.

Authentic diversity has implications for HFES's recruitment and retention of new members, but especially for underrepresented minority groups. Authentic diversity informs the collective imagination and wisdom of HFES; diverse members enable organizations to leverage different perspectives. In practice, this means more and diverse people participating in defining, addressing, and assessing problems in system design. Having more people and perspectives allows HF/E to scale as a field, to have broader and more effective influence. A better community, a more inclusive workforce, generally does better and more work as a collective.

The following sections consider several informal assessments of HFES through this lens of authentic diversity, including recent HFES demographics and activities pertaining to diversity, equity, and inclusion. Particular focus is given to HFES's flagship event – the HFES annual meeting. Importantly, these assessments are based on publicly available information. There may be examples or institutional knowledge that are not publicly documented and were thus unavailable to the authors at the time of writing. There are also ongoing efforts that have yet to be codified organizationally, and ongoing traditions – such as recognition and awards – in which more extensive analyses may be warranted or possible. Indeed, these limitations are revisited in the discussion section of this paper.

An Overview of Diversity in HFES

Over the past few decades and in recent years, HFES leaders and members have invested in activities that support authentic diversity. Using available records and data, there are several ways to consider the recent state of diversity in HFES. First, available demographics data of HFES members from approximately 2014 - 2018 are reported. Next, HFES activity supporting authentic diversity within the organization (from 2016 onward) are discussed, with a focus on annual meeting activities. Following this, recent HF/E scholarship related to diversity, equity, and inclusion are highlighted and discussed.

Metric 1: Recent HFES Demographics

The systematic collection of organizational data is not a robust tradition within HFES. Past reports on HFES diversity relied on the isolated efforts of members or of single committees with inconsistent membership (e.g., members may serve for only one year). These past reports, originally meant for internal use, provided helpful status checks, but the lack of formalizing these efforts for sustained tracking and assessment has made it difficult to compare data across years. To consider more recent trends, a short history of HFES diversity based on 2018 member data is reported here, including information from previous Diversity Task Force and Committee reports from 2014 and 2016 (Carayon, 2016), and information available on the HFES website. From 2018 - 2019, HFES transitioned operations to an external management company, which developed a new website that did not include fields to collect members' diversity data, until fall of 2020. Although incomplete in many ways, the data enable a few observations about diversity in HFES.

Age, Gender, and Membership

Member data from 2018 ($N = 3,517$) at first seem to show that HFES is trending younger, with more women than men in the younger age categories. Roughly 54% of respondents indicated they were 50 years or younger in 2018, compared to 48% of respondents in 2016. In addition, there have been more women under 40 years old, compared to men under 40 years old, since 2014. However, the largest majority in HFES has been older White men, and in 2018, men continued to outnumber women by roughly two to one. A better picture of how quickly demographics are shifting would be to understand membership across time, and how many of the younger members, who initially join as students, continue their memberships after they graduate.

To investigate this further, the 2018 membership categories were parsed, focusing on the two largest groups, "Full Members" and "Student Members." "Full Members – Regular" are considered established working professionals and they make up the largest membership category, at fewer than 50% of the total membership. The second largest membership category is "Student Members – Regular," which make up 18% of the total membership, and includes members who are enrolled as full-time students at an accredited college or university (HFES, n.d.). Student Members have a highly reduced membership rate, and are likely the most transitory membership group. For Student Members, women outnumbered men just slightly, by about 15%. Past reports included in this assessment did not include an analysis of gender by membership group.

Given the history of gender inequality and discriminatory work policies in the U.S., age groups by gender and profession are reported below (Figure 2). This figure includes Full Members only, and excludes: Student Members, 1,447 (41%) members who did not provide their birthyear, and 209 (6%) members who did not report gender*. Less than five people who reported birth year but not gender were also excluded, due to potential identifiability based on employment sector.

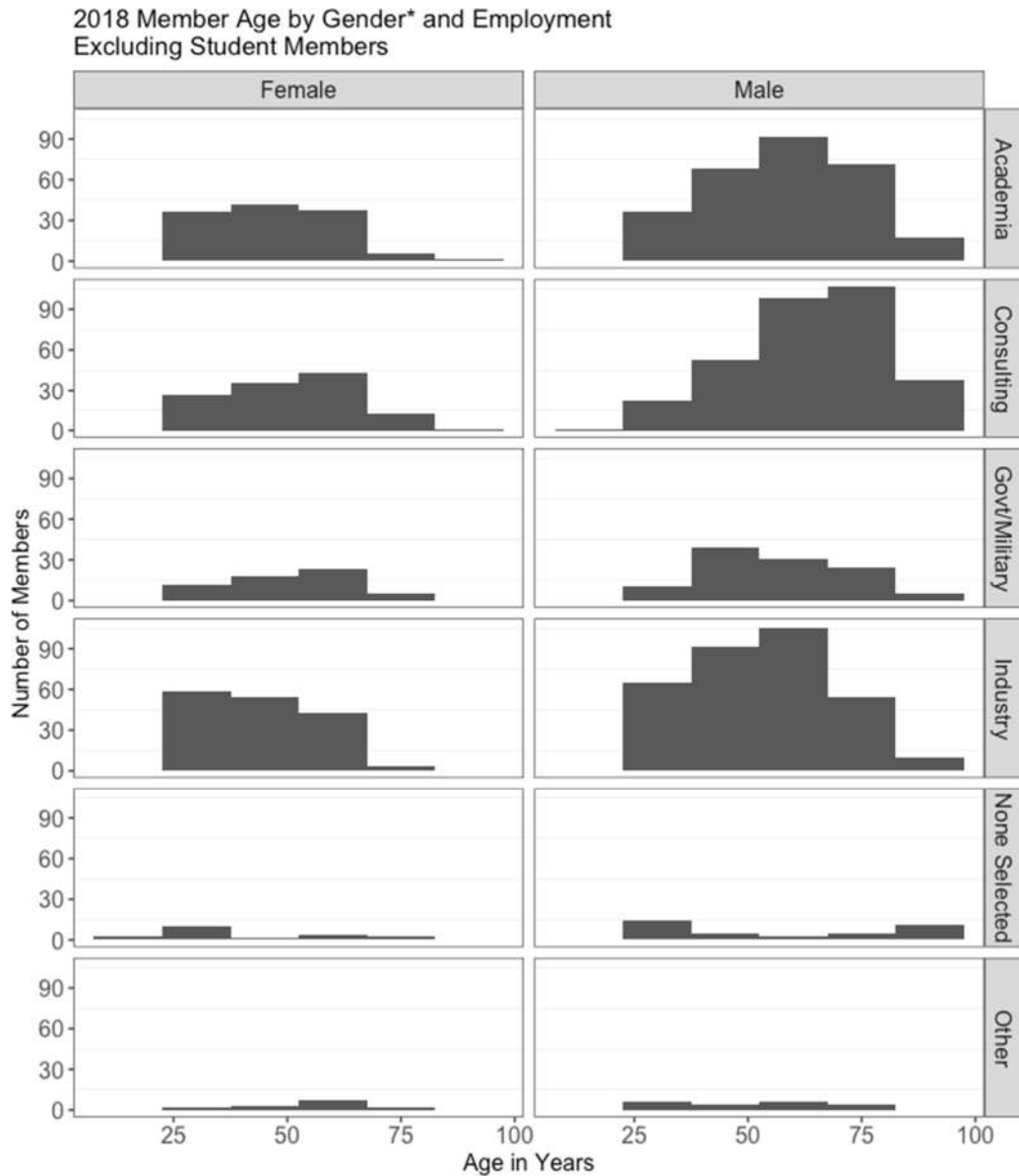


Figure 2. HFES Full Members' age by gender* and employment status are shown in a series of histograms using binwidth = 15 (Wickham, 2016).

* Gender options provided at the time of entry were: "female," "male," or no selection, rather than the modern practice of using "woman" or "man" and offering more inclusive options like nonbinary, prefer to self-describe, and prefer not to say (APA Style, 2020a).

Among Full Members, Figure 2 shows that older men make up the largest majority across all categories of employment sectors, especially in consulting. These results could mean that having more younger women than younger men in the membership is a recent trend with promising results for future diversity in HFES. These results could also mean that women who join as Student Members are less likely to continue on as Full Members, compared to their male counterparts. The answer depends on how many years in the previous decades were there more younger women than younger men, prior to the 2018. Unfortunately, this analysis is not currently available. Of the available historical data, the 2014 report was an emailed member survey that received 666 responses, and the 2016 report with member data did not breakdown age by gender.

Race, Ethnicity, and Gender

Of the HFES members who indicated a race/ethnicity, about 50% of the total membership self-identified as “White” only. The next largest race/ethnicity group self-identified as “Asian” only, making up 10% of respondents. Less than 5% of members in total identified as Hispanic or Latino, Black or African American, American Indian/Alaskan Native, and Native Hawaiian or Other Pacific Islander. Participants had the option to complete this field as part of their profile information in the “Other” section of their online member accounts, and could only select one of the six categories listed above, or leave the default response, which was “None Selected.”

Importantly, the second largest category was “None Selected” with 1,232 (35%) members who did not provide a response for race/ethnicity. The dearth of race/ethnicity options, and the conflation of race with ethnicity (i.e., Hispanic or Latino/x/e), may have contributed to the percentage of members who did not provide a response. Modern practices recommend collecting ethnicity separately from race, such as enabling the selection of “White” *and* “Hispanic,” and to allow for multiple selection of categories, including “mixed race,” “prefer not to respond,” and “prefer to self-describe” with an open response field (Agency for Healthcare Research and Quality, 2009). In addition, the given categories may have been unfamiliar to members from outside the U.S., and thus some non-responses may have overlapped with international members (e.g., from the Middle East). However, less than 10% of members indicated an international origin (including Canada, the next largest group after the U.S.)

Figure 3 parses race/ethnicity by gender and member status, focusing again on the two largest membership groups in the society, Full Members and Student Members, which represent approximately 68% of the total membership. The next largest membership group is Emeritus Member – Regular (15% of the total membership), followed by Affiliate – Regular (4%), and Emeritus Fellow – Regular (3%). Other membership categories that were each less than 3% of the membership include Transitional members, Associate members, and Contributing members, among others (HFES, n.d.).

2018 HFES Member Reported Race/Ethnicity and Gender* (Full Members and Student Members Only)

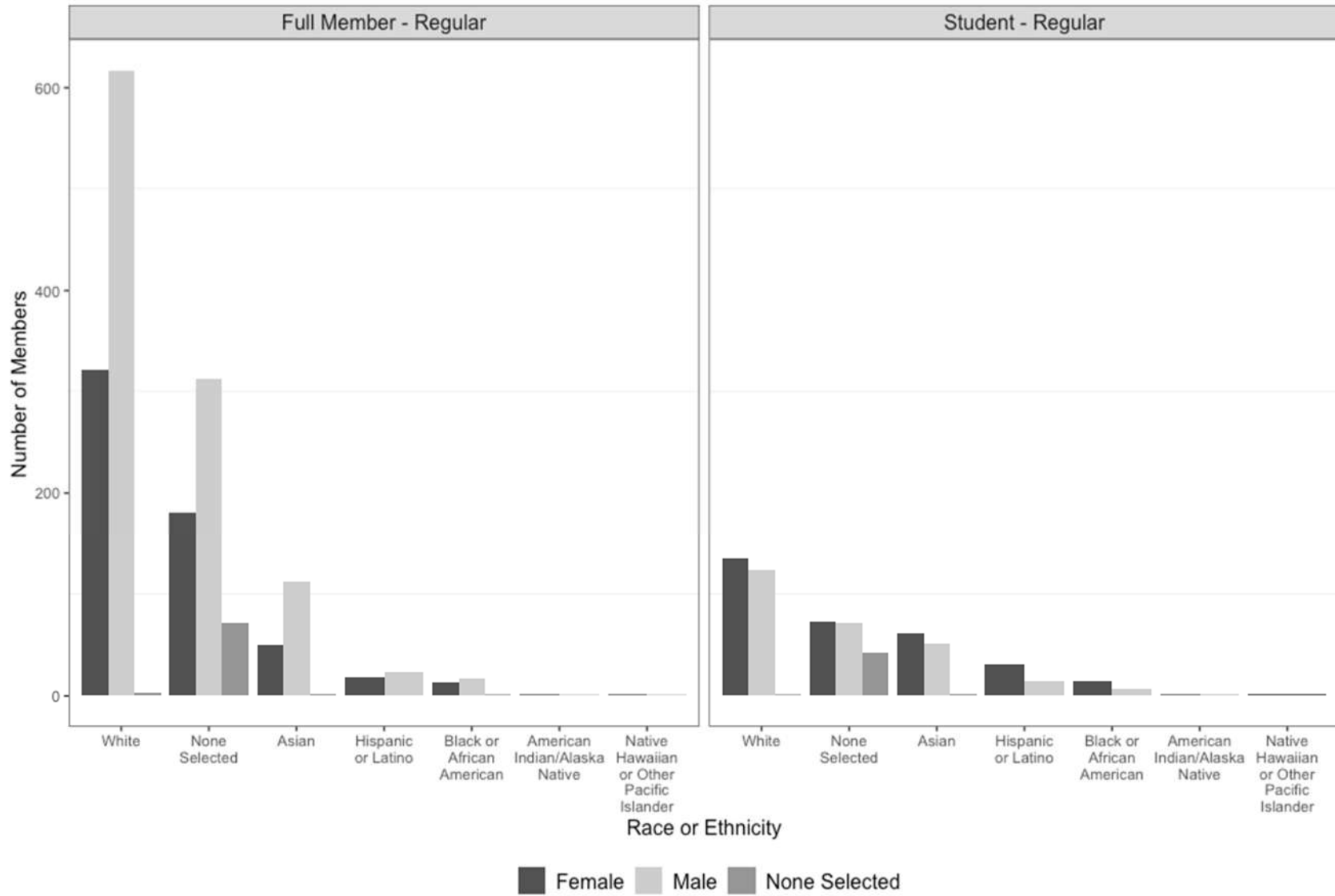


Figure 3. Examining race/ethnicity by gender* shows that HFES was predominantly White and male, which remain the two largest groups overall. Student Members make up just 18% of the membership but contribute much of the gender, racial, and ethnic diversity.

Examining race/ethnicity by gender shows that White men outnumbered White women approximately two to one, and both White men and White women outnumbered all other race/ethnicity groups. Asian men also outnumbered Asian women by roughly two to one in the Full Member category. Generally, men outnumbered women in the Hispanic or Latino, and Black or African American categories, although the gender disparity is not as high. There was insufficient data in American Indian/Alaska Native or Native Hawaiian or Other Pacific Islander categories to discern a more meaningful pattern with respect to gender.

Student Members contribute more diversity to HFES, with women outnumbering men in almost all race/ethnicity categories, and with less of a disparity between racial or ethnic categories. In the Hispanic or Latino and Black or African American categories, women outnumbered men by roughly two to one, with the Student members outnumbering their respective Full Members, as shown in Figure 4. These results may suggest that the racial and ethnic composition of HFES members will be more diverse in the future. However, given a lack of previous analyses for comparison, these results seem to more strongly indicate that many younger members lack diverse role models among more senior members. This lack of diverse, senior role models (i.e., representational diversity) may be a factor in some individuals exiting the organization or profession, especially individuals from underrepresented groups.

2018 HFES Members Who Are Non-White (Full Members and Student Members Only)

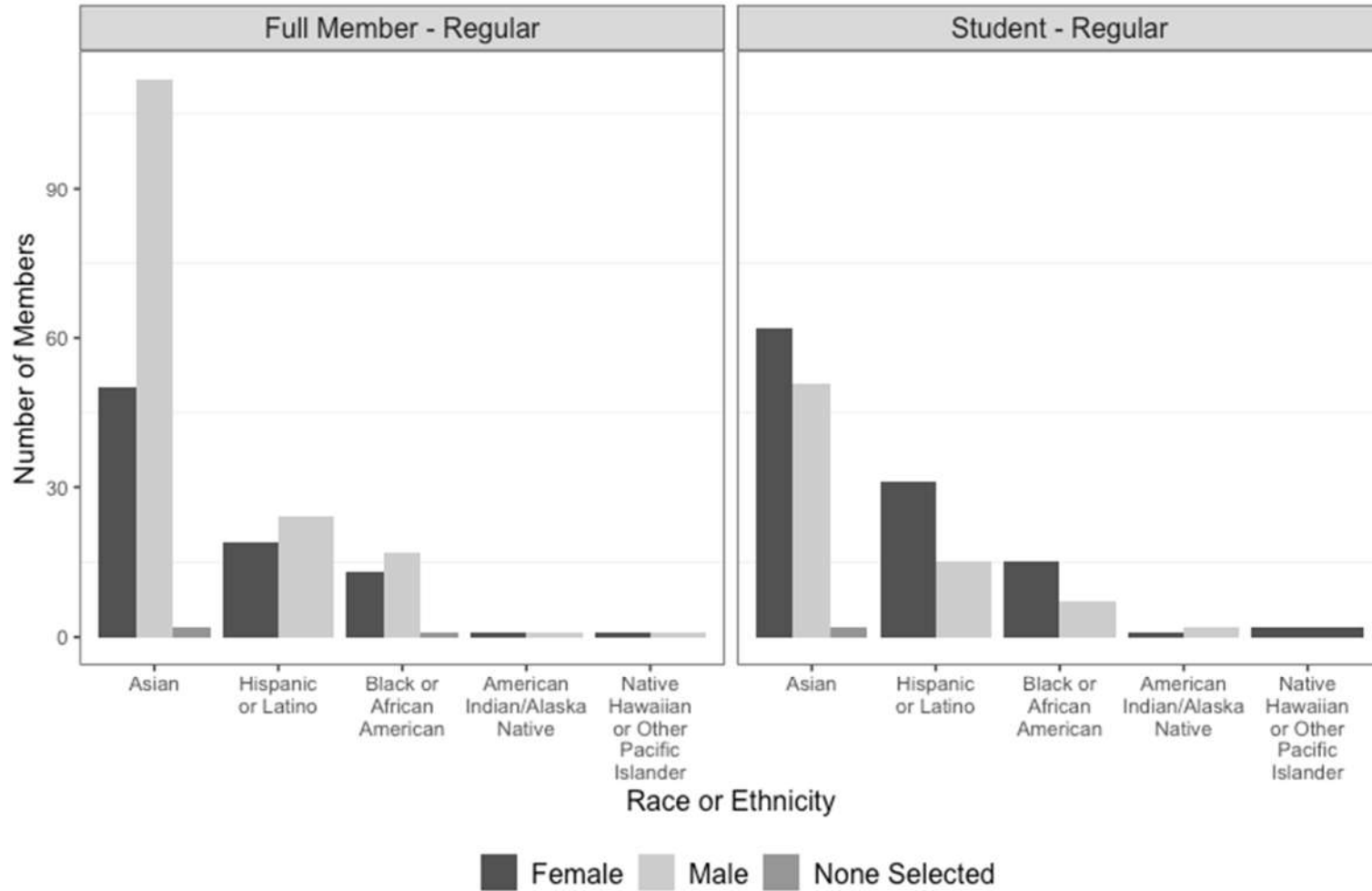


Figure 4. Removing “White” and “None Selected” categories – the two largest “groups” – provides a clearer picture of the racial/ethnic minority and gender composition in HFES in 2018. In these racial/ethnic minority groups, Men who are Full Members tend to outnumber women who are Full Members, especially Asian men to women. For Student Members, women tend to outnumber men.

Race and gender disparities are also apparent in the distribution of Fellows (Figure 5), especially Emeritus Fellow, in which men outnumbered women by a ratio of fourteen to one. The remaining categories of Fellows combined are roughly a ratio of two to one, men to women. Becoming a Fellow requires Full Membership in good standing for at least the five preceding years, submitting an application packet with recommendation forms from three other HFES Full Members, and a committee review. Fellow status is “an honor conferred by distinguished colleagues to recognize outstanding achievement, consistently superior professional performance, exceptional contributions, personal service to the Society, and other meritorious accomplishments” (HFES, n.d.). Therefore, only those who have sustained their membership, who feel valued enough – or who feel there is enough value – to be involved in the Society, are more likely to become Fellows.

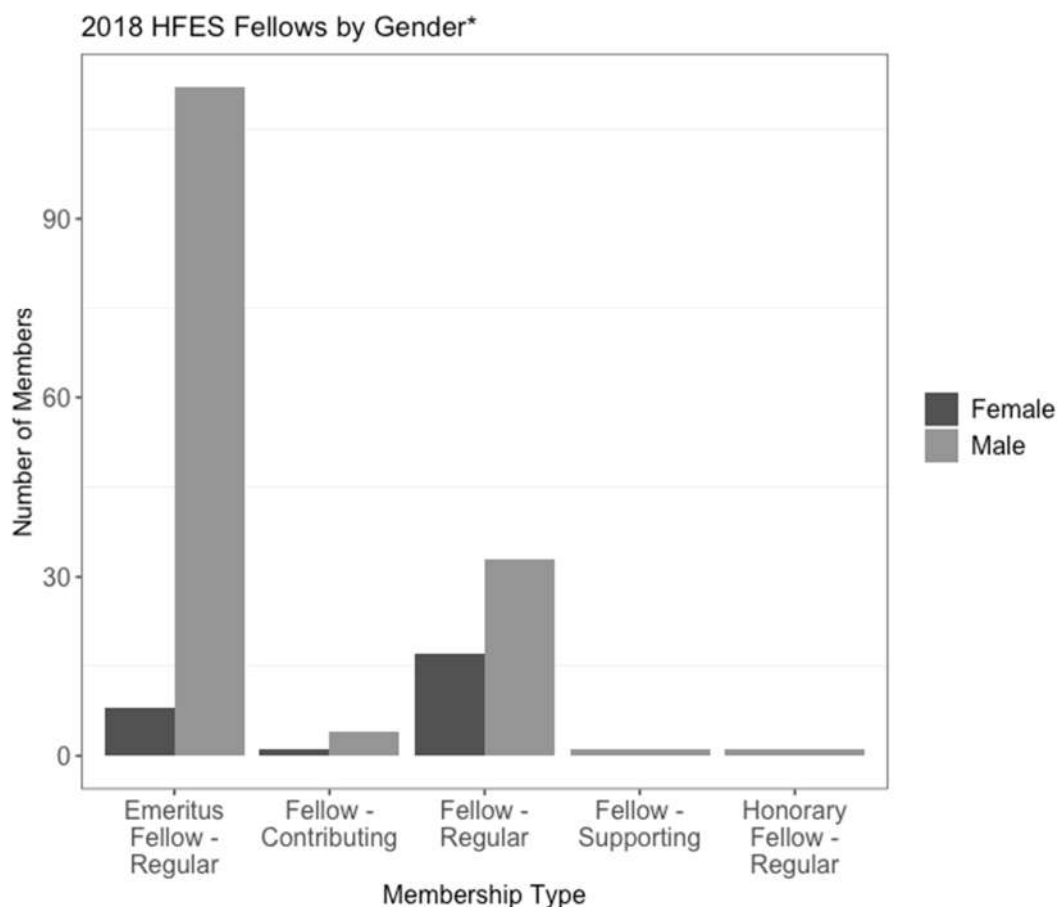


Figure 5. A bar graph of Fellows by gender shows that men were overrepresented in all categories. There were no missing gender data for members reporting a Fellow status.

In terms of race/ethnicity, the vast majority of Fellows indicated “White,” and the second largest category was “None Selected.” As in the previous figures, the demographic makeup of the Fellows likely reflects the history of HFES membership in which earlier members were predominantly White men (Durso, 2014; Stuster, 2006).

In a 2016 report, the proportion of women leaders in HFES, except for President, was found to be similar to the percentage of women members, or about 37% (Carayon, 2016). Based on

previous documentation (Carayon, 2016; Durso, 2014) and a cross-check of the available list of Presidents by name (“HFES Officers, Editors, and Committee Chairs,” n.d.), it is estimated that HFES has had nine Presidents who were women since its founding in 1957, which is a ratio of roughly 7 to 1, men to women. Seven of these presumed women were elected and served within the last 20 years. There is no public documentation of the racial or ethnic identities of the Presidents who have served, beyond second-hand or presumed knowledge that suggests HFES has had a handful of Presidents who may primarily identify with a racial or ethnic minority group, including “Black or African American”, “Hispanic or Latino”, and “Asian”. However, past photos indicate that the vast majority of HFES Presidents have been White (Stuster, 2006).

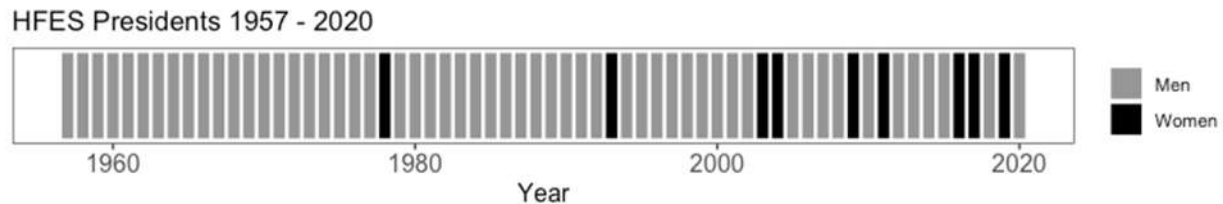


Figure 6. A timeline of HFES Presidents shows an increasing number of women elected in the last two decades. The timeline starts with Laurence Morehouse (1957 – 1958) and concludes with Peter A. Hancock (2020-2021).

In addition to gender, age, race, and ethnicity, other measures of diversity may also be relevant to HFES. For example, other measures may provide insight on the potential pathways and sectors that contribute more or less diversity to HFES. The following sections overview members’ employment sector and international representation.

Employment Sector

Including Student Members, the reported employment sectors that comprise the majority of HFES members were “Academia” followed by “Industry.” This pattern generally held true across most of the minority race/ethnicity categories, and across gender, with the exception of consulting. Consulting comprised over 2.5 times more White men than White women, with little to no representation in the minority race/ethnicity categories.

However, when Student Members were removed (Figure 7), “Academia” dropped below “Industry” and was roughly on par with “Consulting.” As previously noted, Student Members make up much of HFES’s diversity, and likely the high Industry participation in HFES is of mutual benefit to many of the students who join as members and attend the annual meeting in search of networking and job opportunities. As noted in Figure 2, there are more young women in Industry than in any of the other employment sectors.

2018 HFES Member Reported Employment Sector Excluding Students

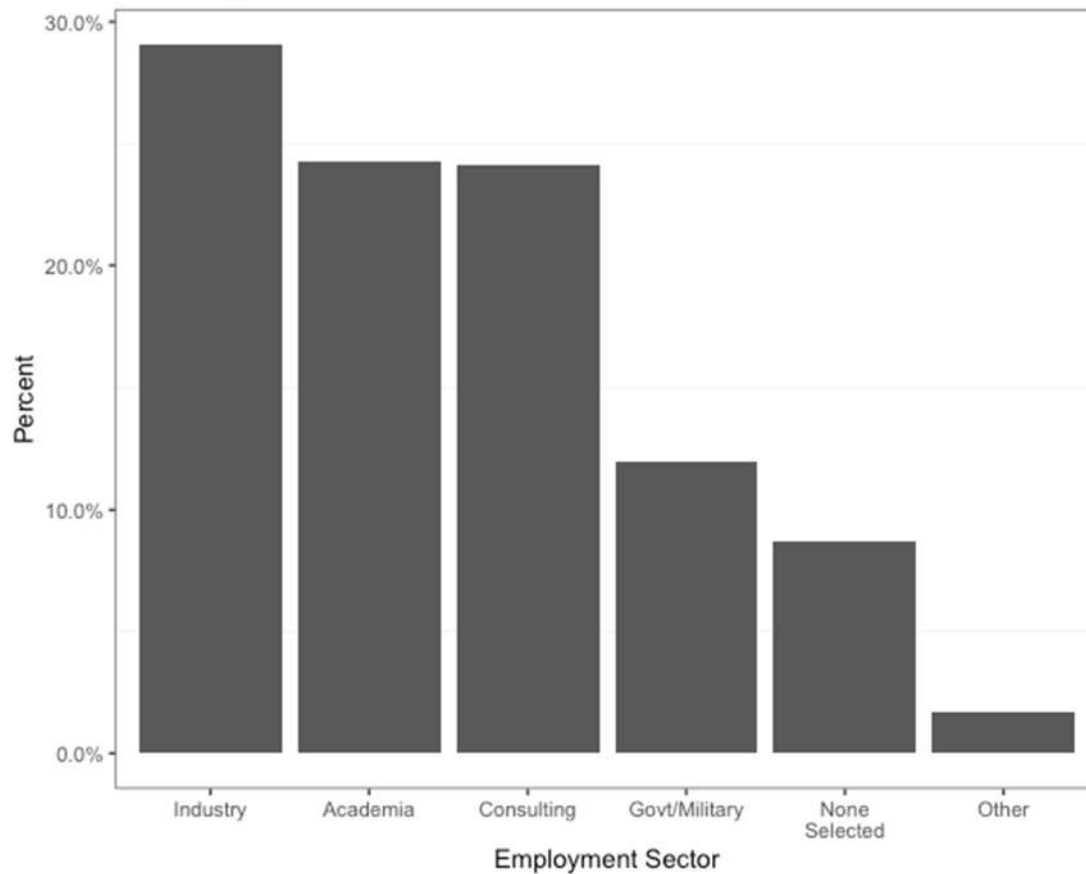


Figure 7. A majority of HFES members in 2018 were in Industry, followed by Academia. This figure excludes Student Members, who primarily split their responses between “Academia” and “None Selected.”

Write-in responses from those who selected “Other” under Employment Sector included: retired, unemployed, retail, health care, law enforcement, construction, information technology, nonprofit research, insurance and finance, standards development, architecture design, postdoc, aerospace manufacturing, and self-employed.

International Representation

In terms of continental representation, less than 10% of HFES members were not from the United States (excluding 30 responses that were not discernable). In the Americas, almost 3,000 members (85%) originated in the U.S., followed by 133 Canadians (4%) and 19 members total from Brazil, Mexico, Colombia, Chile, Ecuador, and Uruguay (in decreasing order then alphabetical). In Asia, China was the largest group (2%) followed by Japan (1%), Singapore, Israel, India, and South Korea. In Europe, the UK (1%) led Germany (>20), followed by Sweden (>15), Netherlands, Norway, Finland tied with Switzerland, and France. Oceania included mostly Australians (2%) and a few New Zealanders. Countries outside of Mexico or South American countries that had less than 5 members included: Austria, Belgium, Denmark,

Estonia, Greece, Italy, Liechtenstein, Luxembourg, Portugal, Spain, South Africa, Mozambique, Nigeria, Malaysia, United Arab Emirates, Kuwait, Lebanon, Philippines, Thailand, and Turkey.

Demographics Summary

The comparison of demographic data from 2018, demographic reports from 2016 and 2014, and informal historical reports (Stuster, 2006) suggests that HFES membership is slowly evolving from its post-World War II origins, which was largely North American, White, and male-dominated. These changes in demographics have occurred alongside broader societal shifts in the U.S. that have also led to changes in the makeup of employment sectors within HFES. This includes moving from primarily military and academic sectors to increased industry and consulting sectors, with more women in higher education, the workforce, and in leadership positions than there were in the beginning of HFES's history.

However, men still outnumber women by at least two to one in almost all categories. The gender disparity is even larger for the most prominently recognized leadership positions, such as members conferred to Fellow status, or members elected to HFES President. Even greater than the gender disparities are the disparities between racial and ethnic groups, particularly between the White majority compared to the minority groups that comprise mainly people of color. Although these disparities are lesser among student members, with women slightly outnumbering men overall, it is difficult to discern if the student member demographics indicate that future membership will be more diverse than it has been in the last several decades. The available data that could possibly address this question are either limited or do not exist. Missing in particular are demographics that include more modern race, ethnicity, and gender categories; data tracked across time; and data on members' and annual meeting participants' perceived inclusion.

Metric 2: Efforts Supporting Authentic Diversity in HFES

HFES has documented its progress in gender parity via a series of profiles on the first woman member (Ruth Hoyt, 1958), Fellow (Dora Dougherty McKeown, 1968), President (Gloria L. Grace, 1978), and Editor-in-Chief (Nancy J. Cooke, 2005) (Durso, 2014). Other efforts to address diversity within HFES include the establishment of the first HFES Diversity Task Force in 1994. The Diversity Task Force was renewed yearly until 2015, which is when diversity and inclusion were added to the HFES Strategic Plan, alongside a transition of the Diversity Task Force to a more permanent standing committee in 2016 by then HFES President William S. Marras. The inaugural Diversity Committee, led by Pascale Carayon, formed a charter "to support diversity and inclusion efforts within the society...by continuing and initiating programming or policies ...[that] foster a culture and atmosphere of mutual respect, to retain, attract, and promote outstanding, diverse human factors professionals" (Chiou et al., 2017, p. 498). Originally part of HFES's Internal Affairs Division, the Diversity Committee was later recognized as a Council Committee in 2019, the highest level in the committee hierarchy (Chiou et al., 2017; "HFES Organizational Chart," 2020).

In recent years, HFES annual meeting programming has consistently included topics on diversity and inclusion within HFES and in HF/E (i.e., related more to professional development or organization, rather than scholarship). A search conducted on the HFES annual meeting programs from 2016-2019 identified these items summarized in Table 1. This list represents an

incomplete selection of activities because it only considers what was documented through print (Human Factors and Ergonomics Society, 2016, 2017, 2018, 2019). However, these activities suggest an increasing awareness of, or sustained interest in, diversity and inclusion as part of HFES and HF/E culture and practice.

Table 1. Diversity and inclusion programming related to community building (“non-technical” items) at the HFES annual meetings from 2016 - 2019

Year	Program Item
2016	1. Panel session, “The HFES Diversity Task Force: Advancing the HFES Vision of Inclusion” – chaired by Smith-Jackson and Pak
2017	1. Panel session, “The HFES Diversity Committee: Challenges and Opportunities for Involvement,” chaired by Chiou and Wooldridge 2. Women’s Group networking lunch is printed in the program 3. Policies section includes a description of “appropriate conduct” for attendees addressing discrimination and harassment
2018	1. Workshop, “Mental Models and Their Impact on Scholarship and Practice: Improving Diversity and Inclusion in HF/E” by Kaunas 2. Plenary session, “Diversity and Inclusion in HFES and Beyond: Striving To Be Better,” chaired by Davis 3. Professional development panel session, “Women’s Leadership in HF/E: Past, Present, & Future,” chaired by Hancock 4. Professional development panel session, “Women and Power: Claim It and Aim It (A Talk for All Humans),” chaired by Blickensderfer 5. “Pink Socks” campaign organized by HFES President Kermit Davis in which bright pink socks were distributed by members of the Executive Council to various attendees. Recipients then give a pair to someone else. As described by Nick Adkins, the founder of Pink Socks, such sharing purportedly generates new connections among members and fosters inclusion at the annual meeting (Pink Socks, n.d.).
2019	1. Panel session, “HeForShe in HFE: Strategies for Enhancing Equality in Leadership for All Allies,” chaired by Stowers 2. Notification of a gender neutral restroom was included in the program

Note. This list likely excludes relevant items, including items that did not use specific terms in their titles, ad hoc events that were organized on-site through “Birds of a Feather,” or the “Student Career & Professional Development” items that were not published in the original program.

This awareness or interest in diversity and inclusion is also demonstrated in the emergence of several “affinity groups,” including the HFES Women’s Group, LGBTQ Affinity Group, and People of Color Affinity Group (“HFES Organizational Chart,” 2020). These affinity groups were either formed “bottom up” by members, as was the case with the Women’s Group, whose activities go back to 2013 (E. Blickensderfer, personal communication, August 24, 2020), or formed “top down” by HFES leadership, as was the case with the remaining groups established in 2018. In all cases, these groups were formed to support and represent the needs of those who identify as members of those groups, or as active allies of those groups. A Leadership Development Committee was also established in 2018 by HFES President Kermit Davis, to work toward making leadership roles in HFES more accessible to a diverse set of future leaders.

These recent activities are not meant to be an exhaustive list, but as a collection they contribute toward authentic diversity in several ways. First, the proliferation of annual meeting panels and affinity groups provide a means of expressing observations, concerns, needs, and goals, to be heard by HFES colleagues and leaders. Second, these activities provide a way for people –

especially those from underrepresented groups – to gather, socialize, and be recognized. These activities increase the visibility of shared concerns and interests for both current and prospective members. This helps to form a foothold for representational diversity, as well as feelings of value, belonging, and power.

Third, these activities communicate that HFES values diverse people and concerns. HFES already comprises numerous Technical Groups that represent a wealth of expertise and areas of focus (i.e., functional and cognitive diversity). However, affinity groups and annual meeting events demonstrate growing attention to demographic or cultural diversity as well. Importantly, both annual meeting events and affinity groups can only occur after review (e.g., peer review of panel submissions or Executive Council review of proposed affinity groups). That these activities occur with official sanction and approval by the Society demonstrates further interest and commitment.

Metric 3: Recent Scholarship Relevant to Authentic Diversity

As suggested by several of the aforementioned panels and activities (e.g., Wooldridge et al., 2018), efforts to be a more inclusive community have paralleled consistent attention to diversity, equity, and inclusion in research and practice. Table 2 notes recent annual meeting papers focusing on diversity, equity, and inclusion themes from various Technical Groups (TGs). These annual meeting papers represent a small selection from the past several decades of annual meeting papers (e.g., Carayon, Haims, Brunette, & Hoonakker, 2002; Newman, 2002; Perchonok & Montague, 2012; Sanders, Farrell, & Pfatteicher, 2006; Smith, Carayon, Smith, Cohen, & Upton, 1994). Across this body of work, there are generally three approaches to addressing diversity issues in research or practice: addressing or discovering group disparities, demonstrating inclusive design or research practices, or demonstrating an intervention with broader societal impact. Notably, the recent selection from 2016 - 2019 covers diverse domains – from product design to urban development, workforce development, education, and healthcare – and all are written by or for HF/E professionals.

Table 2. Technical program items related to diversity, equity, and inclusion scholarship from 2016 - 2019 annual meeting program brochures

Year	Program Item
2016	<ol style="list-style-type: none"> 1. Education TG session presentation, "Development of Game-Based Learning Requirements to Increase Female Middle-School Students' Interest in Computer Science," by Bonner and Dorneich 2. Computer Systems TG session presentation, "Touchscreen Voting Interface Design for Persons With Disabilities: Insights From Usability Evaluation of Mobile Voting Prototype" by Ismirle, O'Bara, Swierenga, and Jackson
2017	<ol style="list-style-type: none"> 1. Opening plenary keynote "Policing Reform Versus Police Reform" by Davis 2. Poster presentation, "Human Capability-Sensitive Design Rules for Products Using Inclusive Design Principles," by Carey and McAdams 3. Education-TG session presentation, "Topics in Inclusive Design for the Graduate Human Factors Engineering Curriculum," by D'Souza 4. Product Design-TG session presentation, "Disability Distribution Modeling for Universal Product Design" by Conrad and Pandey 5. Internet-TG & Computer Systems-TG session presentation "A Desktop Usability Evaluation of the Facebook Mobile Interface Using the JAWS Screen Reader With Blind Users," by Brinkley and Tabrizi 6. Product Design-TG "A Focus Group Study of Blind Voters in Alachua County," by Posadas, Sherman, Mahendran, Burgalia, and Gilbert
2018	<ol style="list-style-type: none"> 1. Panel session, "Human Factors and Ergonomics in Diversity, Inclusion, and Social Justice Research," chaired by Wooldridge
2019	<ol style="list-style-type: none"> 1. Panel session, "HFE in Diversity, Inclusion, and Social Justice: A Practical Primer," chaired by Wooldridge 2. Panel session, "An Exploration of Patient Ergonomics in Historically Marginalized Communities," chaired by Valdez and Holden 3. Panel session, "Human Factors Considerations for Persons Aging-in-Place with Disability," chaired by Beer and Mois 4. Occupational Ergonomics TG session presentation, "Gender and Parity in Statistical Prediction of Anterior Carry Hand-Loads from Inertial Sensor Data," by Lim and D'Souza 5. Poster presentation, "Using Universal Design to Improve the Visitor Experience at the Georgia Aquarium," by Yoo, Li, Khote, Mandula, San Molu, and Lu

Note. An iterative process was used to determine the list of keywords used to search the annual meeting programs: women, female, girl, diversity, disab(-led, -ility, -ilities), rac(-ial, -e), inclus(-ion, -ive), blind, deaf, black, african, latin(-o, -a, -x), ethnic, marginalized, historic, universal, gender, and (dis-)parity. Plenary session titles, descriptions, and the abstracts of returned titles were manually inspected to determine the final items listed. Excluded items included presentations that focused on identifying individual differences without any statement in the abstract relating the results to diversity, equity, or inclusion.

The continued scholarly interest in diversity, equity, and inclusion reflects a few shifts in the profession since its World War II origins. The earliest HF/E work was much more isolated from studying or designing for intergroup differences (Kuorinka, 2000; Lillie, 1950; Stuster, 2006; Taylor, 1993). This may be why this selection of annual meeting papers from 2016 - 2019 still represent a minority among other more established technical topics in HF/E, and why related work published outside of HFES can be found (e.g., Gatehouse, Wood, Briggs, Pickles, & Lawson, 2018; Hardy & Vargas, 2019; Harrington, Erete, & Piper, 2019; O'Leary, Zewde, Mankoff, & Rosner, 2019; Spiel, Brulé, Frauenberger, Bailly, & Fitzpatrick, 2018). Given that published papers tend to represent a selection of the total submissions, it is reasonable to believe that others have tried to submit scholarship related to diversity, equity, and inclusion in the past, and were not successful due to biases about what issues or populations HF/E addresses.

However, the published work ultimately indicates that addressing these issues is an active area of interest for HFES. In comparison to the early years, it seems clear that the field of HF/E has evolved to include broader representation and advocacy for vulnerable groups working or living within oppressive systems. Recognizing that diversity, equity, and inclusion are areas that HF/E can help address, through publications and presentations, contributes to authentic diversity. This recognition may demonstrate to students, and to prospective HFES members, how to productively engage as scholar-activists, and that career success and community impact can go hand-in-hand.

Much more could be written about how HF/E tools and methods could contribute to diversity, equity, and inclusion related efforts. Indeed, there is a longer history of related work that is not reviewed here (e.g., Moray, 1993; Roscoe, Chiou, & Wooldridge, 2020; Smith-Jackson, Resnick, & Johnson, 2013; Stephanidis, 1995; Ward, 1989). However, the primary focus of this white paper is intentionally self-reflective. This self-reflection addresses whether the public, outward scholarship and advocacy of HF/E matches the internal stewardship and practices of HFES. Indeed, assessing whether internal values match external functions is another hallmark of an organization's authentic diversity.

Summary of Authentic Diversity in HFES

In summary, HFES appears to be on a positive trajectory with respect to authentic diversity. This progress is suggested by recent organizational efforts to promote and to establish support for minority groups, and by recent annual meeting programming contributed by individual members. Efforts that embrace authentic diversity – if they are sustained, well-supported, and mindfully implemented – should spur further growth of the society, as well as diversity of its growth in the long run (Bourke & Dillon, 2018; Cedric, 2009; Nemeth, 1986; Sherbin & Rashid, 2017; van Knippenberg & Schippers, 2007).

Nonetheless, there is ample opportunity for improvement, and a critical need to systematically assess and track this growth. If diverse, young people are joining HFES, how does HFES earn their continued membership? How might HFES be failing Black or Indigenous students, that so few of them are members? To inform how HFES is achieving authentic diversity, what data are currently missing (e.g., sexual orientation, disability status, family status, and veteran status), and what data should be collected, at what level of granularity? How does HFES know whether or not its diversity efforts are working? Many remaining questions are summarized into a few discussion points below. These points consider how HFES may become a more authentically diverse organization.

Discussion

The loose framework for authentic diversity described above provides structure for assessing HFES's diversity health. Demographic data, notable milestones (e.g., the "first women"), and activities (e.g., panels) can be interpreted within this framework. The formation of the Diversity Committee and affinity groups are examples of organizational support that serve as both antecedents and indicators of authentic diversity. However, on their own, they may be insufficient. Furthermore, publishing on diversity topics shows intellectual interest and professional commitment, but does not necessarily mean HFES is a diverse or inclusive group.

HFES, must recognize and internalize diversity, equity, and inclusion as fundamental values that guide the organization (e.g., operations, policies, recruitment, events, and outreach) and the work of its members (e.g., research, practice, and service). Systemic change will require committed work at multiple levels and by multiple stakeholders – not just among special interest groups. This work includes understanding:

1. To what extent HFES is an inclusive environment
2. What HFES can do to be more inclusive as an organization
3. How to do work on inclusion, or studying inclusion and equity as HF/E topics
4. How to be inclusive as we work, in our work groups and in our methods

This paper documents some steps taken by individual leaders and members in each of these areas over the past several decades – but has this progress been enough? An essential question that extends from this self-reflection is whether and how we define societal problems – social inequities, and injustice – as HF/E problems. Where do we have the responsibility and capacity for problem-solving? What motivates these open questions is the potential for HFES, as a representation of the HF/E profession and discipline, to have more lasting impact on societal issues that some may describe as beyond our traditional focus.

Prior Efforts

To date, self-assessments of HFES seem to focus primarily on demographic diversity. A revised set of demographics questions developed by the Diversity Committee with inter-committee input (including the Women's Group, Membership, Evaluation, and Leadership Committees), were implemented on the new HFES website in the fall of 2020. However, HFES's demographic tools are still very new, optional, and possibly lacking in some categories. More importantly, these tools lack a standardized reporting process, and lack integration with day-to-day operations. A gap that has resulted from these shortcomings is the ability to trace student members' demographics and their conversion to full members. Another gap is the ability to trace annual meeting participants' demographics, their perceptions of the annual meeting's inclusive climate, and their subsequent conversion (or lack of conversion) to full members.

HFES has previously surveyed its members about its inclusive climate, in a one-off effort by the Diversity Task Force, but only 14% of the membership responded (Lacson, Montague, Pak, & Shaw, 2014). The most recent post-annual meeting survey, for the 2020 virtual meeting, contained no questions regarding climate, despite there existing a short set of questions developed by the Diversity Committee in 2018 for precisely that purpose. Possibly, there remains a perception that questions regarding demographic and inclusion may not be central to the mainstream activities of HFES and should be solicited separately (i.e., as a standalone task charged to the Diversity Committee). Yet, past efforts have shown that response rates are low when responding to these questions is not required or part of mainstream activities.

HFES has implemented diversity as a strategic goal, but HFES is not currently systematically measuring progress toward this goal. Membership applications do not include a place to indicate demographics. Instead, collecting this data relies on members accessing their online account profiles, then electing to update that section. Beyond members' demographic diversity, categories important for assessing representational diversity (e.g., composition of award winners, Executive Council members, and past Presidents), are not documented publicly. Within

HFES, representational diversity – and the presence of diverse role models – may serve as a support function for authentic diversity. Although limited data are available, assessing the race and ethnicity of these groups currently relies on second-hand sources or informal self-reporting. Relying on second-hand sources rather than primary sources is problematic because it may reflect only the perceptions of outside observers, which can differ from personal identities.

For collecting personal identity-related data in most human participant research, current standard practice is to ask people to self-report, and to require a response even if the response is, “prefer not to say.” Current standard practice also involves providing options for reporting personal identity-related data in a way that people can feel closely matches their self-identification (Agency for Healthcare Research and Quality, 2009; APA Style, 2020b, 2020a). At the same time, the allowable options must also increase the utility of the data to the entity collecting them. Therefore, depending on the population size, it may be reasonable to collect a limited set of categories (e.g., for race) while including a write-in field for self-identification.

HFES also does not have any formal procedures for archiving, knowledge sharing, or transitioning efforts between task forces or committees. This means that successful transitions currently rely on the goodwill or organizational skillset of individual volunteers. While committees and task forces are expected to provide annual or semi-annual updates to the Executive Council, it is unclear if and how these reports are stored, shared, or accessed. Except for a published proceedings paper (Smith-Jackson, Pak, Johnson, McLaughlin, & Rovira, 2016), the 2014 Task Force survey results, and 2016 Diversity Committee Report (Carayon, 2016), only two additional Diversity Task Force reports from 1999-2000 were tracked down by the first author after searching for contact information and reaching out to all former Diversity Task Force Chairs (“HFES Officers, Editors, and Committee Chairs,” n.d.)

Without formalized collection, tracking, reporting, archiving, and sharing of data and organizational knowledge, such data and knowledge surrounding our progress on diversity as a Society, will likely be inaccessible to future generations. If future generations do not have access to the ideas, efforts, failures, and achievements of past generations, this severely limits the organization’s ability to learn, to celebrate historical milestones, and to make progress. Just as this paper relied on historical documents compiled by individual members or leaders who served the Society (Carayon, 2016; Durso, 2014; Smith-Jackson et al., 2016; Stuster, 2006), future members and leaders would benefit from having more systematic organizational knowledge transfer. This would allow for the tracking of efforts between cycles and generations of leadership so that important lessons and achievements are not overlooked.

Future Direction

The potential for HFES to grow as a professional home for others, and the potential for HF/E to grow as a profession with broader societal impact, motivates this paper. Research on innovation and economic productivity shows that social inequities involving groups that were historical targets of discrimination and violence, hurts not only the members of those groups, but also the broader population’s productivity and progress for generations (Cook, 2014, 2020). Research also shows that defaults are powerful in guiding personal decisions, defaults like working within one’s own existing networks, and such decisions can have consequential, population-level effects (E. J. Johnson & Goldstein, 2003; Schelling, 1973).

To avoid perpetuating the status quo, HFES must internalize authentic diversity as a fundamental value that guides its activities, including its operations, administration, policies, recruitment, retention, events, and outreach. HFES must also recognize authentic diversity as a fundamental value that guides the work of its members (in research, education, practice, and service). HF/E as a field recognizes that systemic change requires a sociotechnical systems perspective, and working across multiple levels of a system. Within HFES, these levels may look like its members, chapters, leadership, and global network. Fundamentally, systemic change requires better measurement, tracking, and understanding of the extent that HFES is an authentically diverse organization.

Many questions remain about HFES's current status and future that requires additional dialogue and actions within the Society. For example, should a goal for diversity in HFES be to mirror the demographic composition of society? Whatever the case, adopting a more inclusive approach allows HF/E professionals to leverage their substantial expertise, often involving an appreciation for human complexity, to develop better understanding and more effective interventions for human systems. Embracing this complexity, rather than rejecting it, may benefit vulnerable and disadvantaged groups the most – but in fact it benefits everyone.

Conclusion

In HFES's "first 50 years" in review, an early contributor fondly recalled the days in which the membership of about 15 people, "enjoyed monthly dinner sessions and were happy to not have bylaws, officers, or dues" (Van Cott, 2006). Creating intimate and inclusive environments is undeniably central for early career development, and results in the type of meaningful connection that propels a Society forward for 63 years and counting, with 3,500 or more members. Indeed, HFES was known for its inclusivity early on in its history. As the APA Division 21, founded in 1956, wrote,

The Human Factors Society was from the very beginning a multidisciplinary organization that accepted as members anyone who worked or even expressed interest in any of the multiple areas of human factors-area.... Although at its beginning between a third and a half of its members were psychologists, the Human Factors Society has never been viewed as a "psychological society," nor has it indicated any desire to be so perceived (Alluisi, 1993, p. 17).

Yet, creating inclusive environments *for all* can be challenging to manage as organizations grow, especially without mindful and shared responsibility. The question for such organizations is whether or not this continued growth of the membership, and of the profession, is a goal.

History has already seen the split of HF/E into different professional groups within the U.S., with APA Division 21 in 1954 - 1957, and the human-computer interaction community in 1982. In addition to the myriad professional groups that now exist around the world, people working in HF/E or its adjacent fields have many options to call their professional home. To remain competitive in attracting and retaining members, the future of HFES appears to depend on more than the quality of its current contributors' products and research alone. Rather, it also requires a critical look at, and decisive action to advance (1) the diversity and inclusiveness of the organization's activities, and (2) the organization's global relevance and impact in the domains it chooses to embrace.

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