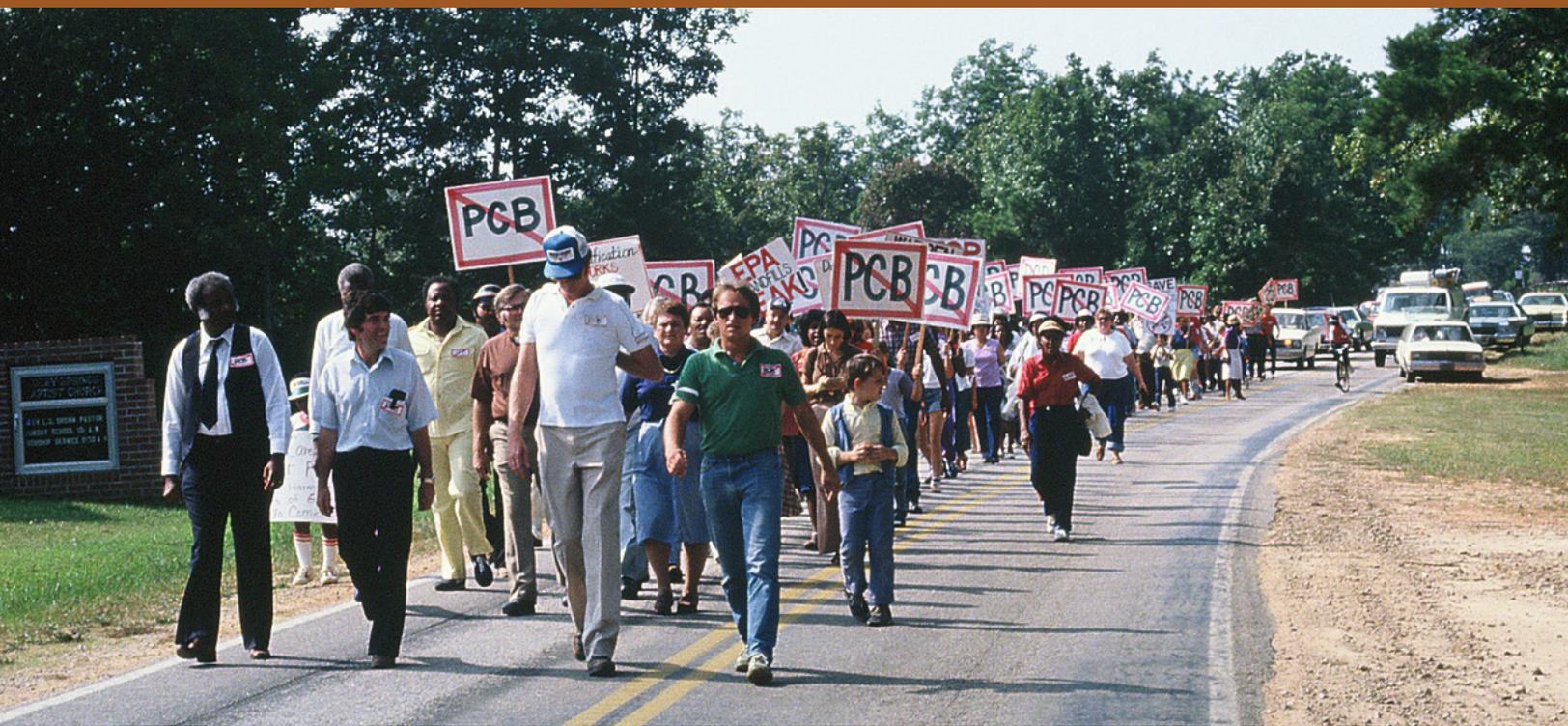


# Center for Environmental Education Research Partner Reports: The Inclusion of Environmental Justice Curricular Content in Interdisciplinary Environmental and Sustainability Degree Programs

*A study conducted by researchers at the University of Virginia  
and the University of California, Los Angeles, in partnership with  
the Council of Environmental Deans and Directors  
of the National Council for Science and the Environment*



**Juan C. Garibay, Paul M. Ong, and Shirley Vincent**

January 2016

## **National Council for Science and the Environment**

The National Council for Science and the Environment (NCSE) is a not-for-profit organization that improves the scientific basis for environmental decision making.

NCSE brings together individuals, institutions and communities to advance environmental and sustainability science, education, and their applications in five strategic areas:

- Strengthening Education and Careers;
- Communicating Science to the Public;
- Hosting the annual National Conference on Science, Policy and the Environment;
- Science Solutions to Specific Environmental Challenges; and
- Advancing Policy that Improves the Connection between Science and Decision-making.

## **University Affiliate Program**

Members of the NCSE University Affiliate Program receive services and collaborate to advance environmental and sustainability programs on their campuses. Benefits include:

- Participation in the Council of Environmental Deans and Directors;
- Membership in multi-institutional collaborations to secure federal funding;
- Exclusive access to information on federal funding for environmental research and education;
- Complimentary participation in the National Conference on Science, Policy and the Environment;
- Campus-wide subscriptions to online environmental and energy news services;
- Special reports and studies on interdisciplinary environmental, sustainability and energy education and research; and
- Sabbatical opportunities.

## **Council of Environmental Deans and Directors**

The Council of Environmental Deans and Directors (CEDD) brings together environmental and sustainability leaders from members of the NCSE University Affiliate Program to improve the quality, stature and effectiveness of academic environmental programs at U.S. universities and colleges. CEDD represents academic environmental programs of all sizes and types. CEDD holds regular meetings that facilitate networking and collaborations. Among its many activities, CEDD supports projects and committees on

- Climate Solutions Curricula
- Curriculum
- Diversity
- Environment & Human Health
- Interdisciplinary Tenure
- Program Assessment

*This report is a product of NCSE's ongoing academic program research and is distributed as a service to members of the NCSE University Affiliate Program.*

Cover photo: Protests in Warren County, NC, in the early 1980s against a PCB-laden landfill in a predominantly African-American community are widely credited as the launch of the environmental justice movement.

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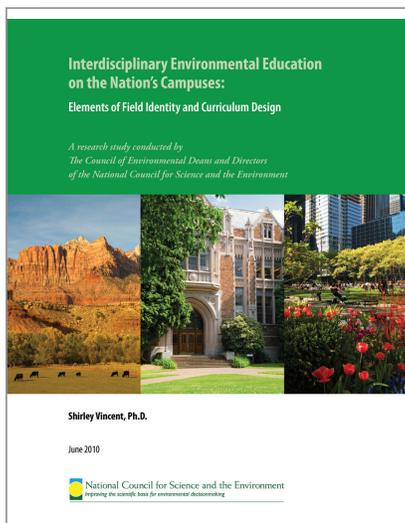
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**Shirley Vincent, Director of the Center for Environmental Education Research (CEER), National Council for Science and the Environment (NCSE).** Dr. Vincent leads two NCSE programs: higher education research and strategic consulting services.

## The NCSE Center for Environmental Education Research

The National Council for Science and the Environment (NCSE) Center for Environmental Education Research (CEER) conducts ongoing research to advance understanding of the evolving fields of interdisciplinary environmental, sustainability, and energy (IESE) education. CEER is led by Director Dr. Shirley Vincent.



The center is supported by NCSE and the Council of Environmental Deans and Directors (CEDD). CEER has conducted censuses of the leaders of IESE degree programs at four-year colleges and universities (2008 and 2012), IESE degree programs at community colleges (2013), and IESE research institutes and centers at research universities (2014). The census information defines and characterizes these populations for ongoing research. National surveys for each of these groups were conducted following each census. The results and findings are presented in a series of reports that include review of relevant literature and profiles illustrating the diversity of programs.

Research reports are targeted to higher education administrators, researchers, educators, policy makers, and students. They are provided as benefits for NCSE's 190+ affiliate universities and colleges. Upcoming reports will focus on IESE degree programs' learning outcomes and core competencies, program assessment and alignment with workforce and societal needs, internal and external partnerships, the connections of IESE and STEM education, and collaborative governance for campus sustainability.

### Partner Research Program

CEER instituted a partner research program in 2013 to support researchers who want to use CEER's exclusive national survey data sets for their own projects. Partner reports are based on research that uses CEER data sets as authorized under a Memoranda of Understanding with individual researchers. Individuals interested in the Partner Research Program should contact CEER for more information.

NCSE partner reports are short, non-technical, and focused on research results. They are not focused on the specifics of methodology but present results using straightforward, accessible language without jargon or specialized technical terms. The researchers publish their research in traditional, peer-reviewed venues as well.

The companion published article for this report is:

Juan Carlos Garibay, Paul Ong and Shirley Vincent (2015): Program and institutional predictors of environmental justice inclusion in U.S. post-secondary environmental and sustainability curricula. *Environmental Education Research*, DOI 10.1080/13504622.2015.1054263

## Executive Summary

“Environmental Justice (EJ) issues and perspectives, which emphasize the disproportionate environmental hazards experiences by low-income communities and communities of color, are often excluded from higher education sustainability discourses and curriculum. Utilizing a national sample of 297 interdisciplinary environmental and sustainability (IES) degree programs, this study identifies program-level values and student racial/ethnic demographics, as well as institutional structural characteristics influencing the inclusion of EJ content in IES curricula. The findings have important implications for IES curriculum and program development, with racial/ethnic and class dynamics in this emerging field.” (Garibay et al., 2015)

This report summarizes the findings of our investigation into the factors that influence the inclusion of EJ curricular content in interdisciplinary environmental and sustainability (IES) degree programs. Key findings include:

- Most IES degree programs include some level of EJ content in their current curricula (15% high emphasis, 32% moderate emphasis, 35% low emphasis). Eighteen percent of programs have minimal/no emphasis of EJ content in their curriculum.
- The importance of EJ content in an ideal IES curriculum is consistently rated higher than the current emphasis for all types of IES degree programs, which may suggest that resource and/or other constraints are impeding a higher level of EJ content inclusion for many IES programs.
- Three program variables have a *direct* positive and statistically significant association with a higher emphasis on EJ content in current (actual) curricula: a higher importance placed on EJ content in an ideal curriculum, an increasing minority (students of color) enrollment trend in the degree program, and a higher emphasis on the social aspects of sustainability in the curriculum. The perceived importance of EJ content in an ideal curriculum for an individual IES degree program is the most important predictor of the emphasis in the current (actual) curriculum.
- Three program variables are *positively* and significantly associated with higher importance placed on EJ content in ideal curricula: a higher emphasis on history as a topic, normative thinking, and social aspects of sustainability in the curriculum. These three program variables also have an indirect positive effect on the emphasis placed on EJ content in the actual curriculum. Thus, programs that place higher value on the social aspects of sustainability in the curriculum, as well as history and normative (values) thinking subsequently place greater emphasis on EJ content in the current (actual) curriculum because those programs are also more likely to place a greater value on EJ content.
- Four program and institutional variables are *negatively* and significantly associated with a higher emphasis on EJ content in current (actual) curricula: the program is offered at a doctoral/research university institution, and a higher emphasis on the business management/economic aspects of sustainability, statistics and ecology in the curriculum.
- Two program and institutional variables are *negatively* and significantly associated with higher importance placed on EJ content in ideal curricula: the program offered at a doctoral/research university institution, and the program is categorized as STE (focused on science, technology, and engineering).

- There is an indirect negative effect between the institutional variable “doctoral/research university” and EJ content in current (actual) curricula. Why IES programs located at doctoral/research universities (compared with master’s colleges and universities and baccalaureate colleges) are significantly less likely to place greater emphasis on EJ content in current (actual) curricula is in part explained by the lower value placed on EJ content in ideal curricula. However, additional research is needed to understand additional factors that may explain this difference in the actual curriculum and why programs located at doctoral/research universities are significantly less likely to place higher value on EJ content in ideal curricula compared to those in master’s college/universities and baccalaureate colleges.

## Environmental Justice in Higher Education Curricula

Environmental justice (EJ) emerged in the early 1980s as a grassroots social movement led by people of color. While marginalized communities in the U.S. have resisted against environmental inequalities since the early seventeenth century (Taylor, 2009), the first national protest by African Americans on toxic-waste disposal occurred in 1982 when Warren County, North Carolina, a predominantly low-income county that had the highest percentage of blacks in the state, was selected as the burial site for over 32,000 cubic yards of toxic soil contaminated with polychlorinated biphenyls (PCBs) (Bullard, 2000). Although the marches and protests against the construction of the Warren County PCB disposal landfill did not prevent the landfill from being constructed, the demonstrations provided the impetus for the mobilization of a national movement for environmental justice (Bullard, 2000). The EJ movement shed light on and challenged the disproportionate burden communities of color and low-income communities face with respect to pollution and other environmental health hazards (Bullard, 2000; Durrett, 1993; Shepard, Northridge, Prakash, & Stover, 2002; Taylor, 2000).

Several years after the Warren County demonstrations, the United Church of Christ's Commission for Racial Justice (CRJ) published *Toxic Wastes and Race in the United States*, a groundbreaking study that revealed how race was the most significant variable in predicting the location of toxic waste landfills throughout the U.S. (Chavis, Jr. & Lee, 1987). The EJ movement has since led to the formation of diverse communities of knowledge that span across the world (Hill, 2003) and EJ efforts have led to many community-university partnerships to help improve existing environmental and health conditions in low-income communities (e.g., Garcia et al., 2013; Shepard et al., 2002). EJ has also become an academic field of study that examines racial, ethnic, gender, and class disparities related to the distribution of natural resources, protection against environmental burdens, and preservation of the natural world at local, national, and global levels (Hill, 2003). Given the importance of developing future leaders in sustainability who are prepared to meet the challenges of extreme poverty, climate change, and global health (AASHE, 2010), learning about EJ offers a promising way for environmental and sustainability education to help meet these goals.

While researchers are beginning to examine the inclusion of EJ in curriculum at the K-12 level (Kushmerick, Young, & Stein, 2007; Nussbaum, 2013), there is currently no known empirical research on the factors associated with the inclusion of environmental justice content in U.S. environmental and sustainability college curricula. Much of the higher education curricula literature on environmental justice education is prescriptive, aimed at getting educators to understand the importance of implementing EJ in curricula (e.g., Adamson, Evans, & Stein, 2002; Gordon, 2007; Hall, Tietenberg, & Pfirman, 2005; Haluza-DeLay, 2013), and descriptive, offering a small number of examples of EJ courses and ways educators can include EJ content (e.g., Agyeman & Crouch, 2004; Chase, 2002; Cheng-Levine, 2002; Figueroa, 2002; Kaza, 1999, 2002; Peloso, 2007; Warren, 1996). This report describes the results of the first empirical study on the inclusion of EJ curricular content in interdisciplinary environmental and sustainability (IES) degree programs in the United States.

### Brief Summary of Methods

**Sample:** The program-level data for this report are drawn from the National Council for Science and the Environment's (NCSE) 2012-2013 survey of IES academic programs merged with institutional

data from the Integrated Postsecondary Educational Data System (IPEDS). The NCSE survey collected data on program administrative structure, resources, degree program attributes and curriculum design, and other related information (Vincent, Bunn, & Sloane, 2013). The survey respondents were IES program administrators: a department chair/head, program or institute/center director or coordinator, and in a few cases, a school or college dean. The final sample includes 297 IES degree programs administered by 200 different academic units/programs located at 179 U.S. institutions of higher education. The survey asked the program administrators to rate the importance of various knowledge and skills areas (including EJ content) in an ideal curriculum for each degree their program offers on a four-point scale: high importance, moderate importance, low importance and minimal/no importance. They also rated the emphasis of knowledge and skills areas in the current (actual) curriculum for each degree according to a similar four-point scale: high emphasis, moderate emphasis, low emphasis, minimal/no emphasis. Another variable used in this study was increasing enrollment of students of color trend over the last three academic years coded as yes (increasing) or no (not increasing).

**Analysis** (see Garibay, Ong, & Vincent, 2015 for more details): First, descriptive statistics were analyzed to understand the sample's distribution on the level of inclusion of EJ curricular content and value toward EJ curriculum. Second, bivariate analyses were used to show percentages of the higher and lower levels of inclusion of EJ curricular content and value toward EJ curriculum across particular program characteristics. Third, cross tabulations were used to understand the joint distribution of the actual inclusion and value toward EJ curricular content.

A recursive path model with two equations was used to examine the association between program and institutional factors and the inclusion of EJ curricular content in IES degree programs. The two endogenous variables are: (1) the importance of EJ in an ideal IES curriculum for an individual degree, and (2) the actual emphasis of EJ in the current IES degree program's curriculum. The importance of EJ in an ideal IES curriculum is used as an additional hypothesized endogenous variable given the extensive literature base on the significance of the purposes and goals of education as well as organizational (i.e., discipline, department, institution) values on decisions about the curriculum (Awbrey, 2005; Conrad & Pratt, 1983; Gaff & Ratcliff, 1997; Hubball & Gold, 2007; Lattuca & Stark, 2009; Neumann et al., 2002; Ratcliff et al., 2004). With a model of this form, the curricular determination process can be analyzed in two distinct steps and the influence of programmatic and institutional factors measured at each stage. The variables for the path model are as follows:

***Exogenous Variables***

- $X_1$ : Science, technology, or engineering field
- $X_2$ : Degree level
- $X_3$ : Students of color enrollment in degree program increasing
- $X_4$ : Importance of environmental sustainability in ideal curriculum
- $X_5$ : Importance of business/economic sustainability in ideal curriculum
- $X_6$ : Importance of social sustainability in ideal curriculum
- $X_7$ : Importance of ecology content in ideal curriculum
- $X_8$ : Importance of history content in ideal curriculum
- $X_9$ : Importance of statistics content in ideal curriculum
- $X_{10}$ : Importance of critical-thinking applications in ideal curriculum
- $X_{11}$ : Importance of normative thinking applications in ideal curriculum
- $X_{12}$ : Institutional control

- $X_{13}$ : Hispanic-serving institution
- $X_{14}$ : Master's college or university
- $X_{15}$ : Doctoral/research university
- $X_{16}$ : Selectivity
- $X_{17}$ : Student-faculty ratio
- $X_{18}$ : Compositional diversity: % Underrepresented Student of Color (USC) of total student body

**Endogenous Variables**

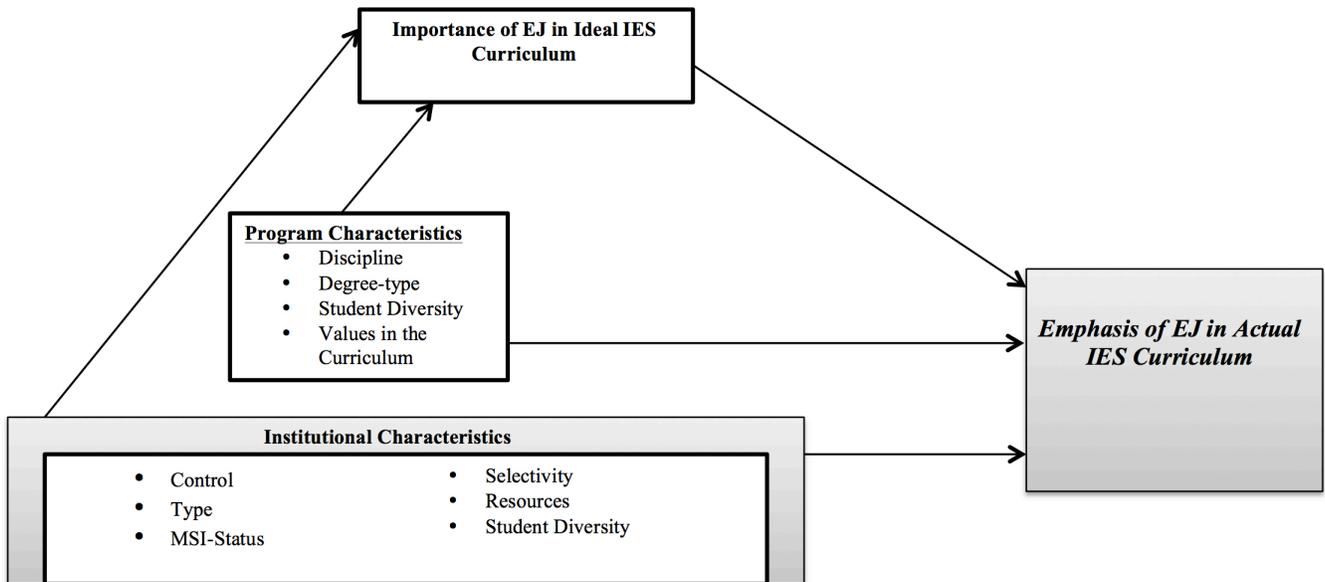
- $Y_1$ : Importance of EJ in ideal IES curriculum
- $Y_2$ : Emphasis of EJ content in actual curriculum

The exogenous variables  $X_1 - X_{11}$  are drawn from the NCSE IES program survey and the remainder  $X_{12} - X_{18}$  from the IPEDS dataset. The selection of exogenous variables for the model was guided by Conrad and Pratt's (1983) curriculum decision-making framework as well as prior research on EJ education. Path coefficients were estimated by performing a structural equation model using the STATA statistical software program, with each endogenous variable ( $Y_1$  and  $Y_2$ ) as a dependent variable and all causally prior variables entered hierarchically as independent variables. Figure 1 provides a visual of the statistical model and the structural equations describing the relations specified in the model are presented below, where  $Y_a$  represents the endogenous variable,  $X_b$  represents the exogenous variables,  $b_{a,b}$  represents the structural effect for  $X_b$  in equation  $Y_a$ , and  $e_a$  represents the residual term.

$$Y_1 = b_{1,1}X_1 + b_{1,2}X_2 + \dots + b_{1,18}X_{18} + e_1$$

$$Y_2 = b_{2,1}X_1 + b_{2,2}X_2 + \dots + b_{2,18}X_{18} + g_2Y_1 + e_2$$

**Figure 1. Conceptual Model for Recursive Path Analyses**



### Values Toward and Actual Emphasis of EJ Content in IES Curriculum

Overall, 47% of IES degree programs emphasized EJ at a high or moderate level within their curricula. The remaining 53% have a low or minimal/no emphasis (Table 1). However, a majority of programs (60%) value EJ curricular content at a moderate or high level.

**Table 1. Percent EJ in Actual Curriculum and Ideal Curriculum**

	Ideal Curriculum	Actual Curriculum
Minimal/None	10%	18%
Low	30%	35%
Moderate	40%	32%
High	20%	15%

### EJ Curriculum Values and Actual Emphasis by Program Characteristics

EJ content importance in ideal IES degree curricula and its emphasis in current, actual curricula follow a normal distribution curve with most programs at the low-moderate level of both importance and emphasis. It is illustrative to group program into lower inclusion and higher inclusion to assess program-level characteristics that may influence the level of inclusion as shown in Table 2. The table illustrates differences in the proportions of programs with lower and higher inclusion by: degree level (undergraduate and graduate), institution control (public or not-for-profit), institution type (Basic Carnegie class: doctoral/research universities, master’s college and universities, and baccalaureate colleges), and whether degree programs are focused on science, technology or engineering (STE). STE degrees include degree programs in environmental science(s), energy and environmental science(s), natural resources, marine/coastal sciences, environmental technology, engineering combined with environmental science(s), water/watersheds, environmentally focused geosciences, and environmentally focused ecology/biology. Non-STE programs include degrees in environmental studies, sustainability/sustainable development, environmental policy, environmental management/assessment, environmental social science and humanities, environmental planning, global/international environmental issues, and systems (including climate and food).

Overall, EJ content was rated of higher importance and its emphasis in current curricula was higher for undergraduate IES programs and lower for graduate IES programs. The value of EJ in ideal curricula was moderate to high for 65% of undergraduate degrees, but only 45% for graduate degrees. Likewise, the emphasis in current, actual curricula was moderate to high for 52% of undergraduate programs, but only 35% of graduate programs.

The importance of EJ in ideal curricula and the emphasis in actual curricula is markedly lower for STE programs compared with non-STE programs; especially at the graduate level. The majority of undergraduate (58%) and graduate STE programs (76%) currently include EJ content in actual curriculum at a minimal/none to low level. More undergraduate STE programs value EJ content as moderate to high in ideal curriculum (53%), but this is not the case for graduate STE programs where less than a third (31%) place a moderate to high value on EJ in ideal curriculum.

In contrast, majorities of non-STE undergraduate (61.5%) and graduate (59%) programs currently include EJ content at a moderate to high level, and three-fourths or more (75%-78%) rate its importance in ideal curricula as moderate to high. While 78% of non-STE graduate programs place a moderate to high value on EJ importance in ideal curricula, fifty-nine percent of non-STE programs include EJ at a moderate to high level in their actual curriculum. This large difference between EJ values and incorporation may suggest that non-STE graduate programs have substantial challenges incorporating the desired emphasis on EJ content.

The emphasis and importance of EJ content in IES degree programs were also associated with institutional characteristics. Degree programs at private institutions, and at master’s and baccalaureate colleges and universities were more likely to have a moderate to high emphasis on EJ content in actual curricula and place a moderate to high value on EJ importance in ideal curricula compared with programs at public and research/doctoral universities. A majority of IES degree programs (60%) at private institutions have a moderate to high emphasis in actual curricula, while a majority of IES degree programs (63%) at public institutions have none to low emphasis. Additionally, a higher proportion of programs at private institutions compared to those at public institutions place a moderate to high value on the importance of EJ content in ideal curricula—69% versus 51%. Two-thirds of IES programs at baccalaureate institutions included EJ content in the actual curriculum at a moderate to high level, compared to 58% of programs at master’s colleges/universities and 31% of programs at doctoral/research universities. Regarding Carnegie Classification, the greatest discrepancy between EJ importance in an ideal curriculum and emphasis in the actual curriculum was for IES degree programs in doctoral/research universities, as 47% of programs in doctoral/research universities placed a moderate to high level of importance in an ideal curriculum but only 31% of these programs placed a moderate to high level of emphasis in the actual curriculum (difference of 16%).

**Table 2. Percent EJ in Ideal and Actual Curriculum by Degree Program Characteristics**

	EJ Importance in Ideal Curriculum		EJ Emphasis in Actual Curriculum		Difference in EJ Importance versus EJ Emphasis
	Moderate to High	Minimal or None to Low	Moderate to High	Minimal or None to Low	Moderate to High
All IES UG (n=211)	65%	35%	52%	48%	13%
All IES GR (n=86)	45%	55%	35%	65%	10%
STE UG (n= 102)	53.5%	46.5%	42%	58%	12%
Non-STE UG (n= 109)	75%	25%	61.5%	38.5%	13%
STE GR (n= 59)	30.5%	69.5%	24%	76%	7%
Non-STE GR (n= 27)	78%	22%	59%	41%	19%
Private institution (n=133)	69%	31%	60%	40%	9%
Public institution (n=164)	51%	49%	37%	63%	14%
Doctoral/Research Universities (n=138)	47%	53%	31%	69%	16%
Master’s Colleges and Universities (n=97)	67%	33%	58%	42%	8%
Baccalaureate Colleges (n=62)	74%	26%	66%	34%	8%

### The Inclusion of EJ in IES Curriculum by Values toward EJ

Cross tabulations were used to help understand how values placed on EJ in an ideal IES curriculum may relate to its incorporation in actual curriculum. Table 3 displays each category of the importance of EJ in an ideal IES curriculum variable in relation to each response category of the “emphasis of EJ in actual IES curriculum” variable. Generally, the findings show that the level of importance placed on EJ in an ideal curriculum tends to match the level of emphasis placed on EJ in the actual degree program’s curriculum, especially for the minimal/none and low categories.

The results show that nearly all (97%) of the IES degree programs that minimally or do not value EJ in an ideal IES curriculum also minimally or do not emphasize EJ in the actual curriculum. Those degree programs that place a moderate or high level of importance on EJ in an ideal IES curriculum also tend to place a moderate to high emphasis on EJ in the actual curriculum, respectively. However, those percentages are much lower as only 64% of degree programs that moderately value EJ also moderately emphasize EJ in the actual curriculum, and only 58.5% of degree programs that highly value EJ also highly emphasize EJ in the actual curriculum.

These findings suggest that, for many IES degree programs, placing a higher level of importance on EJ in an ideal curriculum does not necessarily translate into the same higher emphasis on EJ in the degree program’s actual curriculum, which may signal the lack of resources and curriculum design autonomy often found within these programs (Vincent & Mulkey, 2015). This may make it much more difficult for EJ values to align with EJ curricular emphasis. It is also important to note that these findings also seem to echo the mismatch often found between institutional values for diversity and the actual implementation of diversity initiatives in higher education generally (Chang, 2002; Clark, Fashching-Varner, & Brimhall-Vargas, 2012)

**Table 3. Percent Environmental Justice in Actual Curriculum by Value Placed on EJ**

EJ Importance in Ideal Curriculum	Emphasis of EJ in Actual Curriculum			
	Minimal/None	Low	Moderate	High
Minimal/None	97	0	3	0
Low	16	73	9	2
Moderate	6	26	64	4
High	1.5	15	25	58.5

### Recursive Path Model: Factors Associated with the Inclusion of Higher Levels of EJ Curricular Content

A recursive path model was used to more comprehensively understand the relationship between program and institutional characteristics and the level of EJ content included in the actual curriculum (Figure 1 provides an illustration of the statistical model). Path analysis allows researchers to separate the total effects of one variable on another into direct and indirect effects. A direct effect indicates how a one-unit change in one variable will affect another variable, holding all other variables constant. An indirect effect is the effect of one variable on another mediated by at least one additional variable (one variable affects another variable which in turn affects a third variable). Guided by the literature

the model takes into account that particular program-level and institutional characteristics may not only have a direct effect on the level of inclusion of EJ curricular content, but also may affect values toward EJ curricular content, which in turn may produce a change in the level of inclusion of EJ curricular content. Table 4 shows the results of the recursive path analysis illustrating the direct effects on inclusion of EJ content in actual and ideal IES curricula. Seven of the nineteen variables had a direct relationship:

- *Level of importance on EJ in ideal IES curricula:* This variable explained 54% of the variance in the dependent variable measuring the level of emphasis placed on EJ in the actual curriculum. IES degree programs that placed a higher value on EJ in an ideal IES curriculum have a significantly higher ( $p < .001$ ) level of emphasis placed on EJ in the actual IES curriculum.
- *Increasing enrollment of students of color:* IES degree programs that reported a growth trend in enrollment of students of color have a significantly higher ( $p < .01$ ) level of emphasis placed on EJ in actual IES curricula.
- *Importance placed on other knowledge and skills areas in ideal curriculum:* Degree programs that placed a higher emphasis on “business or economic sustainability,” “ecology,” and “statistics,” in ideal curriculum were significantly and negatively related to the level of emphasis placed on EJ in actual curriculum. Higher importance placed on these areas in ideal curricula was negatively associated with higher emphasis on EJ in current curricula. In contrast, IES programs that placed a higher level of importance on “social sustainability” had a significantly higher level of emphasis on EJ in the actual curriculum ( $p < .05$ ).
- *Institution basic Carnegie classification:* IES degree programs located in doctoral/research universities had significantly lower levels ( $p < .01$ ) of EJ content in their actual curriculum compared to those in baccalaureate colleges.

Four program-level variables and one institutional-level variable were significant predictors of the level of importance placed on EJ in an ideal IES curriculum:

- *Science, technology or engineering focused IES degree:* IES degree programs that are primarily science, technology, or engineering fields place significantly lower levels of importance on EJ in an ideal IES curriculum ( $p < .05$ ).
- *Ideal importance placed on other knowledge and skills areas:* IES degree programs that place a higher level of importance on “social sustainability,” “history,” and “normative thinking skills” in ideal curricula also had a higher level of emphasis on EJ in ideal curricula.
- *Institution basic Carnegie classification:* IES degree programs located in doctoral/research universities, compared to baccalaureate institutions, place a significantly lower level of importance on EJ in ideal curriculum ( $p < .01$ ).

**Table 4. Direct Path Coefficients for Each Predictor on Each Outcome Variable**

Predictor Variable		EJ Importance in Ideal IES Curriculum			EJ Emphasis in Actual Curriculum		
		Coef	S.E.	Sig.	Coef	S.E.	Sig.
Program Characteristics	Science, Tech or Engineering field	-0.16	0.08	*	0.06	0.08	
	Degree Level: Graduate	0.10	0.08		0.05	0.09	
	Student of Color Enrollment Increasing	0.15	0.09		0.24	0.09	**
	Ideal Curr: Environ Sustainability	0.13	0.07		0.06	0.07	
	Ideal Curr: Bus/Econ Sustainability	0.08	0.06		-0.20	0.06	***
	Ideal Curr: Social Sustainability	0.23	0.06	***	0.14	0.07	*
	Ideal Curr: Ecology	0.07	0.05		-0.13	0.05	*
	Ideal Curr: History	0.29	0.05	***	0.09	0.05	
	Ideal Curr: Statistics	0.03	0.05		-0.14	0.05	*
	Ideal Curr: Critical Thinking	0.003	0.09		0.02	0.09	
	Ideal Curr: Normative Thinking	0.29	0.06	***	0.08	0.06	
Ideal Curr: Environmental Justice	-	-	-	0.64	0.06	***	
Institutional Characteristics	Institutional Control	-0.12	0.11		0.01	0.11	
	Hispanic Serving institution	0.12	0.25		-0.04	0.26	
	Masters Coll/Univ (ref: Baccalaureate)	-0.10	0.11		-0.08	0.11	
	Doct/Research Univ (ref: Baccalaureate)	-0.31	0.11	**	-0.32	0.12	**
	Selectivity (1 to 4 highly selective)	-0.02	0.05		-0.03	0.05	
	Student-faculty ratio	-0.02	0.01		-0.004	0.01	
	Percent USC <sup>1</sup> of total student body	0.02	0.02		-0.004	0.02	

Note: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

<sup>1</sup> Underrepresented Student of Color (African American, American Indian, Native Hawaiian, and Latina/o)

Table 5 shows the *indirect* effects on the level of emphasis placed on EJ in an actual IES curriculum through the level of importance placed on EJ in an ideal IES curriculum. Five variables had an indirect effect:

- *Science, technology or engineering focused IES degree programs:* While the categorization of STE had a direct negative relationship with the level of importance placed on EJ in an ideal IES curriculum, STE did not exhibit a significant indirect influence on the level of emphasis placed on EJ in the actual IES degree program’s curriculum. However, the significance level of this indirect effect was .054, only slightly above the .05 level.
- *Ideal importance placed on other knowledge and skills areas:* IES degree programs that place a higher level of importance on “social sustainability,” “history,” and “normative thinking skills” in an ideal IES curriculum also place a greater level of importance on EJ in an ideal IES curriculum, which in turn is related to increased emphasis on EJ in actual curricula.
- *Institution basic Carnegie classification:* Doctoral/research universities not only have a direct negative relationship with the level of emphasis placed on EJ in an IES degree program’s actual curriculum, but also exhibit an indirect negative influence on the level of emphasis placed on EJ in an IES degree program’s actual curriculum through its direct negative relationship with the level of importance placed on EJ in ideal IES curriculum.

**Table 5. Indirect Effects on Actual Curriculum Through EJ Importance in Ideal Curriculum**

		Emphasis of EJ in Actual Curriculum		
		Coef	S.E.	Sig.
Program Characteristics	Science, Tech or Engineering field	-0.10	0.05	~
	Ideal Curr: Social Sustainability	0.15	0.04	**
	Ideal Curr: History	0.18	0.04	***
	Ideal Curr: Normative Thinking	0.19	0.04	***
Institutional Characteristics	Doctoral/Research University	-0.20	0.08	**

Note: ~0.5 < p < .06, \*p < .05, \*\*p < .01, \*\*\*p < .001

## Implications for IES Education Policy and Practice

The results from this study offer several key implications for future policy and practice. First, this report demonstrates that while many IES programs highly value EJ and have incorporated EJ into the curriculum, EJ is not yet fully valued and incorporated into all IES degree programs. Not including EJ in the curriculum of IES degree programs in essence may potentially signal to many students a lack of concern with environmental issues pertaining to communities of color and low-income communities on the part of the program. Not teaching IES students about EJ may limit the ability of these future environmental professionals to address EJ issues in their careers, which can lead to adverse health outcomes for people of color and low-income populations.

Additionally, the lack of greater inclusion of EJ issues in IES curriculum may have important implications for student learning and development. While research has yet to examine the influence of EJ curriculum on student outcomes, meta-analytic studies on diversity courses have consistently shown that including the perspectives of different racial and ethnic groups in the curriculum increases students' cognitive development (Bowman, 2010), civic behaviors and dispositions (Bowman, 2011), and reduces prejudice toward other racial and ethnic groups (Engberg, 2004; Denson, 2009). Integrating environmental justice perspectives into IES curriculum may thus lead to a variety of desired educational outcomes and also prepare students to attend to the highly charged political realities of some environmental and sustainability careers (Agyeman & Crouch, 2004).

Second, this study has implications for IES program curriculum development and suggests that both program-level and institutional-level factors impact the integration of EJ into IES curriculum. The most critical of these factors is the value placed on EJ within the IES degree program. For campus officials interested in strategies to change IES curriculum to include EJ content, it is essential to have a specific agenda that focuses on increasing the value placed on EJ. The study demonstrates that one way to increase the value placed on EJ within IES degree programs may be to emphasize the social dimension of sustainability. Within IES degree programs, placing greater value on environmental or economic dimensions of sustainability does not ultimately result in the inclusion of EJ content in IES curriculum. In fact, IES programs that place greater emphasis on business or economic dimensions of sustainability have significantly lower levels of EJ in the actual curriculum. Additionally, placing greater emphasis on environmental sustainability does not significantly predict the level of EJ in the actual curriculum.

The value placed on EJ is also associated with other program-level and institutional-level factors. The findings indicate that a primary focus on science, technology or engineering, other content values, and institution type all seem to affect the value placed on EJ in IES degree programs. More directly integrating EJ into the educational goals of IES degree programs, especially those focused on science, technology, and engineering (e.g. environmental science, environmental engineering, etc.) and those that are business-oriented, as well as the overall mission of the institution is likely to advance the incorporation of EJ content in IES curriculum.

Although faculty in STE focused IES degree programs may question whether topics of environmental justice, racial and ethnic diversity, and inequality should be covered in these interdisciplinary environmental programs, many STE educators have successfully incorporated these important topics

into science and engineering courses (see Chamany, 2001; McGowan, 2005; Reilly, 2015; Schneider, 2004). Furthermore, the connection between science and inequality (see Harding, 2006), the historical legacy of scientific racism (see Hammonds and Herzig, 2009), and research showing that students who major in science, technology, engineering, and math have lower social and civic outcomes at the end of college (see Garibay, 2015) provides an important justification for the integration of EJ into STE-focused IES degree programs. Additionally, campus officials can further increase the value placed on EJ by creating awareness of EJ issues through courses, public lectures, workshops, reports, and campus newspaper articles and digital media.

Third, this study has implications for racial and class dynamics within this emerging field and the wider environmental and sustainability movement. Findings show that an increasing proportion of students of color within IES programs does not translate into a higher value placed on EJ and does not indirectly influence the level of emphasis placed on EJ in the actual curriculum through EJ values. This may suggest a lack of integration of the values of students of color with the values of IES degree programs. Instead, this study found that an increasing enrollment of students of color had only a direct significant positive relationship with the level of emphasis placed on EJ in the actual EJ curriculum. This finding led to an additional study to further understand the relationship. The findings of that study will be presented in a future report. Although it is impossible to determine whether this latter finding indicates that having EJ in IES curriculum is attracting more students of color or whether having an increasing enrollment of students of color stimulates the adoption of EJ, inclusive leadership within IES degree programs would require that academic units integrate EJ into the curriculum, even when there are very few or no students of color enrolled in IES programs. Campus officials and educators within IES degree programs should make concerted efforts to increase racial and ethnic diversity within these fields and fully integrate the needs of students of color into the fabric of IES degree programs to create more inclusive environments.

Finally, although this study was not able to account for the successful integration of EJ into IES curriculum over the long-term, it is important to note that the literature indicates potential barriers for the long-term success of EJ in higher education. In order to truly integrate EJ into IES degree programs and facilitate the long-term success of this integration, it is critical to hire faculty specializing in EJ research (Hall et al., 2005); support research methods in line with the philosophy of EJ (i.e., participatory action research) in tenure, promotion, and appointment processes (Hutson, 2013); to protect EJ researchers from industry retaliation (Shrader-Frechette, 2012); to defend EJ curricular content, especially in the sciences (Padgett, 2001); and to incorporate pedagogical methods consistent with EJ principles (Kaza, 1999, 2002). Without these levels of support, it may be difficult for IES degree programs to sustain the integration of EJ issues into the IES curricular content especially over the long-term.

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