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UNIVERSAL DESIGN IN U.S. ARCHITECTURAL EDUCATION: SUCCESSSES AND CHALLENGES

BETH TAUKE, MEGAN BASNAK AND SUE WEIDEMANN

Abstract

The World Health Organization estimates that over one billion people, or 15 % of the world's population, have some form of disability. Despite changing demographics and an aging world population, it seems that architecture programs in U.S. universities have been slow to incorporate universal design (UD) into their curricula. In an effort to gain a better understanding of the current state of UD content in architecture curricula, researchers distributed an online survey to architectural educators and administrators in 120 U.S. institutions with accredited degree programs. The study, sponsored by the National Institute on Disability and Rehabilitation Research (NIDRR), consisted of qualitative and quantitative questions that sought information related to the understanding, attitudes, and incorporation of UD into each participant's curriculum.

Reponses were obtained from 463 participants representing 104 of the 120 surveyed schools. Quantitative analyses found relationships between perceived attitudes of administrators, faculty, and students and the effectiveness of UD components. Results also showed great variability across schools in terms of how, when (course level), and the degree to which UD aspects were incorporated into programs. Qualitative findings revealed valuable insight into potential ways to increase the relevancy of UD in architecture curricula.

Keywords:
universal design, inclusive design,
design education, design
curriculum

Universal design in architectural education

With roots in the Civil Rights Movement of the 1960s, universal design (UD) is a relatively new concept that has evolved into an essential element of current design practice. The first-known mention of UD came in 1977 from architect Michael Bednar, who promoted the removal of environmental barriers and recommended a “much broader and more universal” concept that “involves the environmental needs of all users” (Bednar, 1977, p.1–4). Architect Ron Mace is credited with coining the term universal design in the mid-1980s. He made the case that universal design is “not a new science, a style, or unique in any way. It requires only an awareness of need and market and a commonsense approach to making everything we design and produce usable by everyone to the greatest extent possible” (Mace, 1985, p.147–152). Since that time, universal design has become a worldwide movement that promotes equity and social justice through design.

As such, universal design has become an architectural driver for the future, and, thus, is an essential component of 21st century architectural education. There are number of reasons for this. First, demographic trends indicate that there are more children and older adults than ever before. With more people at the ends of the increasing age spectrum comes a variety of functional limitations associated with early development and aging. The current generation of children, baby boomers, older adults, people with disabilities, and individuals inconvenienced by circumstance, constitute a market majority (Center for Universal Design, 2008). As conscientious designers, architecture students need to understand the “new human bodies,” which change dramatically and interface with the built environment in significantly different ways over time. Second, the increased focus on healthy living in U.S. society is “moving the nation away from a health care system focused on sickness and disease to one focused on wellness and prevention” (CDC, 2014). This includes “clean air and water, safe outdoor spaces for physical activity, safe work-sites, healthy foods, violence-free environments and healthy homes” (CDC, 2014). Wellness, one of the eight goals of universal design, is a new design emphasis that includes strategies that contribute to health promotion, disease avoidance, and injury prevention (Steinfeld and Maisel, 2012). Architecture curricula throughout the country are reflecting this focus with more courses on health in the built environment. Third, by virtue of social media and increasing air travel, our world is more interconnected by the day. That connectedness fosters situations in which an awareness of cultural diversity is fundamental to global citizenry. Understanding ways that heritage and background influences values, assumptions, thought processes and relationships has opened our society to respect for and acceptance of differences that would not have been tolerated by the U.S. population just a few decades ago. UD goals include social integration, treating all groups with respect, and cultural appropriateness, respecting and reinforcing cultural values as well

as the social and cultural context of any design project (Steinfeld and Maisel, 2012). As a social practice, UD takes concepts such as equity and justice, and translates them into material and spatial realities. Despite its complexity, this skill and sensibility requires careful study and practice starting at the beginning of architectural education and continuing as a life-long learning pursuit.

The demographic, technological, and social changes that brought us to this point are increasing the need for thoughtful and inclusive approaches to architectural education. UD can provide a template for moving forward, but evidence-based decision-making is necessary for new educational initiatives. For decades, we have been relying on assumptions and anecdotal evidence about UD content in architecture programs throughout the U.S. While many nation-wide efforts have been positive, researchers need to investigate the on-the-ground activities to determine what has worked, what has not, and what actions should be taken to proceed in thoughtful and meaningful ways.

Previous universal design initiatives

During the past 25 years, there have been three major initiatives in the U.S. to encourage the incorporation of UD content in architecture programs: Universal Design Education Project (UDEP) (1993–96), Architecture for Social Justice (2003–04), and Bridging the Gap (2009–10). All three initiatives were sponsored, in part, by the National Endowment for the Arts (NEA).

Universal Design Education Project

The Universal Design Education Project (UDEP) was developed by the Adaptive Environments Center, now known as the Institute for Human Centered Design.¹ The UDEP “invited college and university design faculty to submit proposals based on the culture of their own schools, and their own experience and teaching styles” (Ostroff, 2001). In addition to NEA funding, this project was supported by grants from the NEC Foundation of America, the U.S. Department of Justice, and the Center for Universal Design. UDEP encouraged a wide range of teaching methods to infuse UD into design curricula, and required the involvement of people with disabilities. The first pilot project took place in 1993–94 in 22 schools across the country. It involved faculty teams in architecture, industrial design, interior design, and landscape architecture. The second pilot was in 1995–96 and included eight schools, five of which were from the first group. The 1993–94 project was documented in *Strategies for teaching universal design* and included case studies from each of the pilot programs (Welch, 1995). The essential participation of people with disabilities as “user/experts” in the teaching and learning of universal design was described in *Innovation*, the quarterly journal of the Industrial Designers Society (Ostroff, 1997).

1 The Institute for Human Centered Design (IHCD), founded in Boston in 1978 as Adaptive Environments, is an international non-governmental educational organization (NGO) committed to advancing the role of design in expanding opportunity and enhancing experience for people of all ages and abilities through excellence in design. IHCD’s work balances expertise in legally required accessibility with promotion of best practices in human-centered or universal design. <http://www.humancentereddesign.org> [Accessed June 25, 2015].

Architecture for Social Justice Awards Program

The Architecture for Social Justice Awards Program: Partnerships in Teaching was developed by the Adaptive Environments Center and invited studio faculty from National Architectural Accrediting Board (NAAB)-accredited undergraduate or graduate architecture degree programs to engage in social justice projects with a universal design approach. The intent was “to recognize and support faculty who are leading studios that address human equity for both students as well as those who inhabit or experience the built environment” (UDEO, 2004). The awards program documented the creative ways that faculty taught architecture as a socially embedded discipline as well as the ways that faculty fostered an atmosphere of collaboration and respect in their studios. Awardees presented their studio work at the 2004 Social xCHANGE Symposium at the Rhode Island School of Design and the projects were published in *Universal Design Education Online* (2004).

Bridging the Gap Project

The Bridging the Gap Project: Using Architecture and Social Justice to Increase Access to Universal Design, developed by the Center for Inclusive Design and Environment Access (IDeA),² aimed to increase awareness and knowledge for the next generation of architects about design for pluralistic populations. Supported by the National Endowment for the Arts, Bridging the Gap provided Historically Black Colleges and Universities (HBCUs) with architecture programs “an opportunity to develop curricula on universal/inclusive design to improve the lives and welfare of America’s urban and rural underserved communities” (Tauke and Hunter, 2010). In addition, it encouraged HBCUs to take leadership roles in the UD education of architects. This 18-month project, which took place in 2009–10, was a collaboration between six of seven HBCUs with architecture departments. Faculty from the various programs worked together to develop UD materials, sponsor speaker exchanges, and promote inclusive service activities by HBCU architecture schools in order to increase public awareness of the importance of UD in African American communities. The project provided participating schools an opportunity to develop their own agendas and work with each other to determine the best ways that UD could improve their own communities and influence the wider architectural community.

Further need for evidence

While a number of smaller, university specific projects have taken place over the last few decades, the three described in this paper are the only documented initiatives involving several U.S. architecture programs that shared information and new knowledge within a larger group. As a result, there is a demonstrated need to better understand the state of UD education in U.S. architecture schools as a whole. This paper presents results from a research study that sought to answer the following research questions:

- 2 Since 1984, the IDeA Center (Center for Inclusive Design and Environmental Access) has been a leading site for research, design, service, education and dissemination activities related to universal design. The Center was founded by Edward Steinfeld, an architect and Professor of Architecture at the University at Buffalo, to serve as a vehicle for sustained research and development activities in this field. The primary goal of the Center is to produce knowledge and tools that will increase social participation of groups like people with disabilities and the older generation, who have been marginalized by traditional design practices. <http://idea.ap.buffalo.edu/Home/index.asp> [Accessed June 25, 2015].

1. How do administrators, faculty, and students feel about UD?
2. To what extent is UD taught in architecture programs?
3. How is UD incorporated into design curricula?
4. How effective are existing UD components in architectural curricula?
5. What strategies would be most effective at increasing the relevancy of UD in architectural curricula?

The two parts of the study included an online survey of architecture administrators and faculty from institutions with accredited degree programs (primary component) and informal interviews with select faculty from various institutions (secondary component). The survey gathered both quantitative and qualitative information while the interviews were used as a means to follow up with qualitative issues that were raised in the survey results.

Phase 1: Online survey of U.S. architectural faculty and administrators

Sample

Architectural faculty and administrators in 120 accredited degree programs in the U.S. were targeted for the survey. Principal investigators compiled a list of potential schools from which to contact faculty and administrators for the survey using an online directory of accredited degree programs provided by the Association of Collegiate Schools of Architecture (ACSA). Based on this list, the names and email addresses of architecture faculty and administrators were gathered from each school's online faculty and staff directory. Over 4,400 individuals obtained in this manner were invited via email to take the online survey.

Instrument

The survey consisted of questions that sought both quantitative and qualitative data. Questions included multiple choice and open-ended answer styles, and covered three major content areas: 1) background information about the participant, 2) attitudes and understanding related to UD, and 3) the nature of incorporation of UD into the curriculum. The first content area asked participants to identify their institution type (public, private, etc.) and role in the program. The second content area sought information related to attitudes and understanding of UD such as the participant's understanding of UD and general faculty, student, and administrator attitudes toward UD in their programs. The third content area pursued information related to UD's role in the curriculum including whether or not it was addressed, at what level and in what courses it was addressed, and general ways in which it was incorporated. Questions also sought information related to how effective participants felt

UD components were in their curriculum and asked for suggestions for increasing UD's relevancy not only in their programs, but in architectural education in general. The survey concluded by giving participants the option to provide their institution's information in order to allow the investigators to track school response rate (number of schools contacted versus number responded).

Analysis

Survey Monkey, an online cloud-based company, was used to collect survey responses. Responses were downloaded into Microsoft Excel and Statistical Package for the Social Sciences (SPSS). Other than an I.P. address, Survey Monkey recorded no other identifying information from participants.

Two data sets were created from the survey responses; one consisted of the responses to all items by the individuals who completed the survey. The other was a set of responses to all quantitative items for the schools. Because there were differing numbers of respondents from each school, a mean score (for all respondents within a school) was computed for each quantitative item. This was done to avoid over-representation by schools with large numbers of respondents.

Descriptive, comparative, and correlational analyses were used to provide information about the five questions regarding administrator, faculty and staff attitudes about UD; the extent to which it is being taught; its incorporation into curricula; its effectiveness; and ways to increase UD's relevancy in architectural education.

Survey responses

Responses to the survey were obtained from 463 participants representing 104 of the 120 surveyed schools. Based on identifying information provided by survey participants, schools from all six ACSA-defined regions – Northeast, Mid-Atlantic, West, Gulf, West Central, and East Central – were represented in the survey results. The region with the lowest response rate (in terms of number of schools represented versus number of schools contacted) was the Gulf region, with a response rate of 63 % (10 out of 16 schools). The East Central region had the highest response rate of 100 %, with participant responses from 20 schools out of a possible 20 schools contacted.

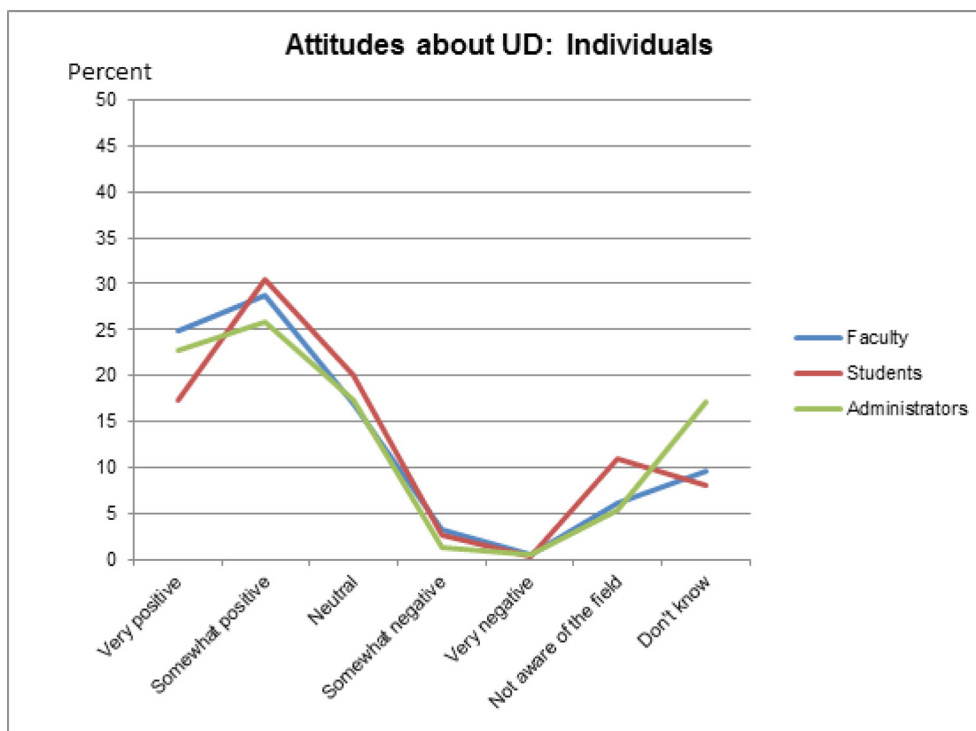
Of the 463 respondents, 70 % reported that they were faculty members and 12 % identified themselves as administrators. In regards to the level of understanding of UD, 24 % exhibited a high level of understanding and 52 % exhibited an adequate level of understanding. Only 4.8 % were not aware of the term or did not know what it was. However, 18.8 % made no response, or wrote responses that were not relevant to the question.

Selected findings

How do administrators, faculty, and students feel about UD?

Respondents were asked to describe the attitudes of their administrators, faculty, and students toward UD, on a five-point scale (from very positive to very negative). Results are shown for the sample of “individuals” and for “schools”. The school scores were created by averaging the responses of all individual respondents from each school.

Individuals responded positively in terms of attitudes about UD, with very little difference in terms of the groups about which they were asked. Figure 1 below shows that, in general, respondents felt that others in their program were quite positive about UD. (Note: The figure shows the percentage of people for each response choice.)



It is also important to note the percentage (ranging from 5 to 12 %) of people who responded that they felt that others were not aware of the field. Additionally, they themselves were not aware of their colleagues’ feelings (8 to 17 %), with them being least certain about administrator feelings (17 %).

When asked about administrator, faculty, and student attitudes toward the concept of UD, responses showed that faculty held the most positive attitudes, with students and administrators having somewhat less positive attitudes.

Figure 1
Attitudes about universal design
(individual respondents)

Is UD being taught?

Of the individual respondents, 68.8 % said that UD was addressed in their program’s curriculum, 18 % said it was not addressed, and 13.2 % indicated that they did not know whether or not it was addressed. Of those respondents who said that UD was not addressed, only one-third reported that there was an interest in incorporating it into the curriculum.

When looking at this question by respondent role, table 1 below shows that the more “experienced” (tenured) respondents were more likely to say that UD was addressed in their curriculum.

Table 1
Is universal design addressed in your curriculum?

Role of respondent		Administrator	Tenured faculty member	Tenure-track faculty member	Adjunct faculty member
Yes	N	46	118	57	42
	%	85.2%	75.6%	68.7%	51.2%
No	N	6	26	15	21
	%	11.1%	16.7%	18.1%	25.6%
Don't know	N	2	12	11	19
	%	3.7%	7.7%	13.3%	23.2%
Total	N	54	156	83	82

When the individual responses for each school were averaged to create a “school score”, we found that 69 % (70 schools) had unanimous agreement among their respondents that UD was addressed in their curriculum. Twenty three percent (23 schools) gave mixed responses (yes and no), and 8 % (8 schools) said that UD was not present.

From the aggregated school data, we could learn if there were other differences, e.g. between ACSA regions, or between public and private schools, in terms of whether or not UD was addressed in their curriculum. No significant difference (t-tests for independent samples) was found for the comparison of public to private schools, in terms of UD being addressed in their school. Nor were there any significant differences (one way anova) among the six ACSA regions. This suggests uniformity in level of UD presence in curricula across the country.

How is UD incorporated into the design curriculum?

The information about where UD is covered in the curriculum proved to be quite complex. One way to understand it is to look at what academic level UD material is taught and/or incorporated into the curriculum. Table 2 below is a summary of the degree to which UD education is present within the program curriculum. Out of the 104 schools surveyed, data on the level of infusion was obtained from 72 schools. Some programs covered it only at the early undergraduate level, others only at the

graduate level, while others had a mix of levels at which it was covered. As can be seen, most schools addressed UD only in a portion of their programs. Only 8 % of the schools addressed UD throughout their entire program.

Table 2
Presence of UD in curriculum

Level of presence	# of school responses	% of responses
1 st or 2 nd year <u>OR</u> 3 rd , 4 th or 5 th year <u>OR</u> grad	55	76.4
Mixed (lower & upper) <u>OR</u> (upper & grad <u>OR</u> lower & grad)	11	15.3
Infused throughout	6	8.3

Of the 237 individuals that identified the types of course in which their curriculum incorporates UD, 32.5 % identified that UD content only appears in studio courses, while 13.9 % stated that UD content appears only in non-studio courses, including lectures and seminars. The remainder of responses (53.6 %) identified that content appears in both studio and non-studio courses.

Table 3
Types of courses with UD content

Course type	# of responses	% of responses
Studio	77	32.5
Non-studio	33	13.9
Both	127	53.6

Perceived effectiveness of UD components

When asked how effective the UD components were in their curriculum, 15 % said they were “very effective”, 57 % said “moderately effective” and almost 28 % said they were “neutral”, “ineffective”, or “didn’t know”. Figure 2 below shows the detailed findings for 242 individuals who answered this question. This clearly suggests that almost three-quarters felt that the content was at least moderately effective.

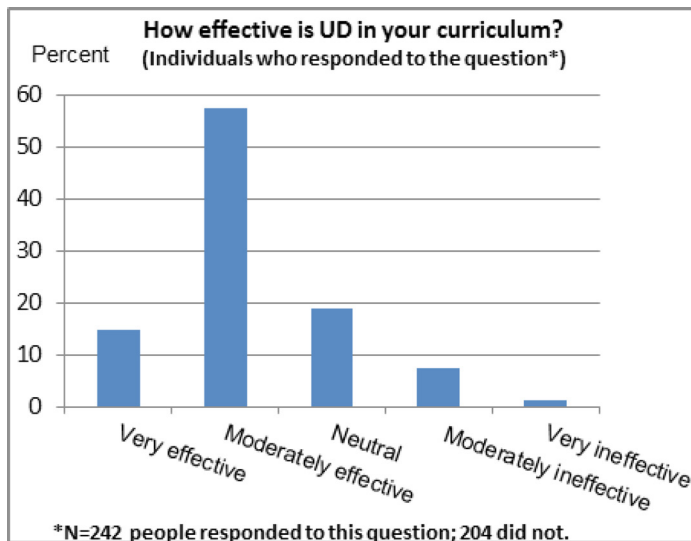


Figure 2
Effectiveness of UD in curriculum (individual respondents)

Relationship between attitudes and effectiveness

It is interesting to look at the relationships between the questions asking people to indicate what attitudes about UD would be for other people in their program and how effective they thought the UD components in their curriculum were. Table 4 below shows correlations among these questions for both the individual responses and for the school scores.

Table 4
Correlations among perceived attitudes and effectiveness of UD components

Perceived attitudes of:	Individual data (N~300)	School data (N~93)
Faculty	.33**	.36*
Students	.36**	.13
Administrators	.33**	.15

* Pearson Correlation is significant at the 0.05 level (2-tailed).

** Pearson Correlation is significant at the 0.01 level (2-tailed).

For the individual respondents, there are significant relationships between attitudes and UD effectiveness for all items; however, for school scores, only faculty attitudes are positively related to UD effectiveness. But a parsimonious question to ask is: Which, if any, of the attitude items can significantly predict the perceived effectiveness of UD components in a program? A stepwise linear regression analysis was completed for both data sets. In both cases, only faculty attitudes were a significant predictor of level of UD effectiveness in the program.

Increasing the relevancy of UD in design curricula in school's curriculum

When asked to provide suggestions for increasing the relevancy of UD in the curricula of their schools, individuals provided a wide variety of responses that were grouped by the researchers into nine categories through content analysis. Two hundred seventeen individuals provided 242 responses. Over half of the responses (51.1 %) recommended that UD content should be more integrated into coursework and curriculum. Others (12.4 %) suggested that UD would be more relevant if additional support and training in the topic for faculty and administration is made available. Surprisingly, only 7.9 % of individuals felt that UD needed to be defined more clearly. Additionally, only 4.5 % felt that incorporating UD into accreditation and/or licensure requirements would make the philosophy more relevant in their schools' curricula. These two unexpected findings may be because of the open-ended format of this question. Perhaps the findings would have been different if survey participants were asked to rate the relative importance of each of the categories listed in table 5. Consequently, if a follow up survey were to be completed, these categories (which were determined based on the open-ended responses) could be used to develop a scaled question to better understand the importance of each individual option.

Table 5
Suggestions for increasing relevancy of UD in own school's curriculum

Answer category	# of responses	% of total responses
Integrate into curriculum/coursework	126	52.1
Provide more support/training for faculty and administration	30	12.4
Better clarity in defining UD	19	7.9
Offer more workshops/charrettes/design competitions/conferences/opportunities for learning	12	5.0
Incorporate into accreditation/licensure requirements	11	4.5
Provide better materials for teaching UD concepts	10	4.1
More research	5	2.1
Include more diverse students/faculty	5	2.1
Misc.	24	9.9

Some of the particularly compelling open-ended responses from the most cited category, "Integrate into curriculum/coursework", add insight to the quantitative summary:

Acknowledge the presence of "universal design" in existing projects. It should not be prescribed, but simply recognized as thoughtful, thorough design.

Connect issues of social diversity to studio projects throughout the curriculum.

Present evidence of it being a recognizable paradigm of architectural and scholarly research. As it stands, most know of it as design for physically handicapped individuals. This reductive vision of the field must be consciously combatted.

Emphasize the one healthy planet concept integrating human, animal, and environmental wellness. Universal design recognizes design for people of all ages and abilities and backgrounds and is a central focus for design thinking and the problem-solving process of design.

Include the history and theory of universal design in the history and theory courses, including trends in the international and multi-cultural context of contemporary society.

I would suggest that universal design could be approached through a broad survey of its application across all design disciplines, industrial, communication, service, etc. so that it could be understood as an ethic that works at many scales.

I'd advise creating a vertical course (lecture or seminar) (open to all majors if a lecture) to discuss issues like race, age, sex and class as they crop up in the built environment. This could (a) energize everyone's latent sense of the issues (b) spark interest in the rest of a universal design curriculum (c) maybe even redress the paltry diversity in student and faculty populations. Diversity is a useful term for discussing or introducing universal design, and its discourse can energize across disciplines as it regards both curricular issues and also the participation of many kinds of students, faculty and client populations.

This is a generation consumed by the notion of 'sustainable design' – we have just started to stress the notion that sustainability is not just about solar panels. It starts at the human level and Social Sustainability INCLUDES Universal Design.

Increasing the relevancy of UD in design curricula in general architectural education

Individuals responded somewhat differently when asked to provide recommendations for increasing the relevancy of UD in architectural education in general. Open-ended responses were organized into 10 different categories. Two-hundred-eleven individuals provided 252 responses with just under half (46.8 %) recommending that UD content needs to be more integrated into coursework and curriculum. Others (11.9 %) suggested that UD would be more relevant if it was incorporated into accreditation and/or licensure requirements. This value is compared to only

4.5 % of individuals that recommended this to increase relevancy in their own schools. While 12.4 % of individuals recommended providing more support or training in UD for faculty and administration in their schools, only 4.8 % of individuals suggested this as a solution for increasing relevancy in general architectural education. Only 6.7 % felt that UD needed to be more clearly defined.

Table 6
Suggestions for increasing relevancy of UD in general architectural education

Answer category	# of responses	% of total responses
Integrate into curriculum/coursework	118	46.8
Incorporate into accreditation/licensure requirements	30	11.9
Provide better tools for teaching the philosophy	21	8.3
Better clarity in defining UD	17	6.7
Offer more workshops/charrettes/design competitions/conferences/opportunities for learning	14	5.6
Provide more support/training for faculty and administration	12	4.8
More public recognition of the philosophy	8	3.2
More research	4	1.6
Include more diverse students/faculty	4	1.6
Misc.	24	9.5

A sample of the open-ended responses from across the categories that enhance understanding of the quantitative summary include:

The fastest way to increase the relevance of universal design is to elevate UD to a core value of design that would then find its way into National Architecture Accreditation Board (NAAB) accreditation standards.

More educational conferences and workshops should be held at universities through collaboration with universal design organizations like the IAUD (International Association for Universal Design). Include this topic at American Collegiate Schools of Architecture (ACSA) conferences to allow an exchange of ideas on best practices at a variety of architecture schools.

Students are always looking for good case studies to build their knowledge base. An excellent publication of notable universal design solutions would interest many students.

Broadly publish in both theory-based presses and in the professional press.

For me, it would mean producing writings that actively engage other areas of the humanities including disability studies, racial and ethnic studies, and gender and sexuality studies. How is “Universal Design” different from these areas? Is it an umbrella discourse that encompasses these areas? Is it a distinct area of scholarship that bends the trajectories of these social critiques toward a particular direction?

More competitions for universal design (especially ACSA), or establishing universal design as evaluation criteria for design competitions.

Avoid trite and essentializing terminology, such as words like “universal”. The “universal” denies important aspects of the problem such as variability and temporality, and shuts down the conversation before it starts. And then there’s the extreme cultural bias embedded in the term...

Greater promotion/discussion of the concepts by which design actively hinders differently-abled individuals, followed by design projects which directly address these issues. This should be done in addition to integrating UD concepts throughout all design projects, with a focus on UD-thinking rather than prescriptive solutions to meet requirements.

Discussion

Despite the lack of existing literature documenting the incorporation of universal design into university-level architectural education, the survey results from this exploratory study found that a significant number of accredited programs in the United States address UD concepts somewhere in their curriculum. Sixty-nine percent of both individual respondents and aggregated school responses indicated that their curricula addressed UD. One possible reason for this discrepancy is that very little has been written on universal design in architectural curricula, and the latest sources date to 2009. The UD field has grown significantly since that time, and the literature might not reflect the current state of curricula.

Another possible reason for the higher-than-expected value for incorporation may be a result of respondents mistakenly identifying accessibility curricular elements as UD. Accessible design is a subset of UD. UD considers all human-environment conditions, especially those that typically are overlooked. While accessible design often is noticeable in a stigmatizing way, Universal Design blends in with the mainstream.

A third possible explanation for this higher-than-expected level of incorporation may have to do with a possible “social desirability” or “social acceptance” response bias (e.g., Choi and Pak, 2005). This occurs when respondents want to cast themselves in a positive light, or they want to respond in the direction they perceive to be desired by the investigator.

We have no way of determining if this did happen; further study would be necessary.

In addition to the higher than expected extent of incorporation of UD curricular elements into architectural education, the study also found that perceived attitudes of administrators, faculty, and students toward UD were more positive than the existing literature implied. Almost half of all individuals responded that they felt their students, faculty, and administrators had at least somewhat positive attitudes toward UD. The results showed that attitudes that are more positive are strongly correlated with a positive presence of UD in the curriculum and higher levels of understanding of the discipline.

Infusion of UD content throughout the curriculum demonstrates a school's exceptional commitment to UD as a component of architectural education. Of the 69 % of schools that reported incorporating UD content into their curricula, 8 % (6 schools) reported full infusion. Again, this value is higher than expected based on course searches, literature reviews, and the newness of this area of research and field of study.

An overwhelming majority of individuals felt that, in order to become more relevant both in their schools and in architectural education in general, UD should be better integrated into coursework and curricula. Based on this response, the next overarching question is how faculty and administration of architecture programs can be encouraged to incorporate more UD-related materials in their courses and studios.

Phase 2: Qualitative follow up to survey with faculty and administrators

While the survey showed that many accredited schools of architecture in the U.S. include UD content in their curricula, the level of incorporation varies greatly from one school to another. To explore this further outside the purview of the survey, a number of U.S. architecture professors were contacted and asked to comment on the various ways that UD is taught in their program. These faculty members were selected from survey responses where faculty members identified themselves or were faculty known to the research team. They represented departments varying in degree of incorporation. The following material presents the findings from this approach.

UD content and faculty responsibility

In many cases, UD content has been the responsibility of one or two faculty members within a department, and is not a fixed component of the curriculum. For example, at Woodbury School of Architecture in Los Angeles, CA, Department Chair Marc Neveu reports, "one of our profes-

sors conducted a universal design funded research project and ran a studio on the topic. In addition to this, another professor conducted a series of in-house symposia” (Neveu, 2015).

In other cases, UD content is required, but remains the charge of one or two instructors. A long-time proponent of universal design, Professor Bradford Grant from Howard University in Washington, D.C. states:

I incorporate Universal Design into Architecture and the Environment, the first architecture course that our beginning students take. This is an introductory course that exposes, informs and acculturates the first year students to the various aspects of the built environment. I use an experiential teaching and learning method. These students find this topic new, and are very open to learning about UD in this setting (Grant, 2015).

Professor Wesley Henderson, who integrates UD into studios explains, “When I taught at Hampton University, I always wove universal design into my studio course in the first year and fifth year, but did not explicitly list it in the syllabus” (Henderson, 2015). At times, these professors who teach UD courses also are designated as studio critics who evaluate work in other courses from a universal design point of view. Architecture professor, Dr. Arvid Osterhaus serves in this role at Iowa State University:

I developed a graduate elective course on inclusive design, which also is open to advanced undergraduate students. It fills up every year. We do a lot of hands-on work around campus and share the results with university facilities planning staff. In addition, during the past few years, I have been active as a “visiting studio critic” in order to address inclusive design issues throughout the curriculum (Osterhaus, 2015).

UD content and faculty interpretation

Associate Professor Lynne Dearborn from the University of Illinois Urbana-Champaign describes a common discussion between faculty members regarding the role of UD. Students in this program are introduced to accessibility issues in their junior level design studio. According to Dearborn:

There is debate among the faculty about the use of the concept of Universal Design, and so accessibility is not always addressed using the lens of Universal Design. In short the debate is as follows: One side believes that Universal Design is an appropriate mechanism to begin to get students to understand that this is about more than just meeting basic accessibility criteria. It is a conceptual stance about designing the environment to facilitate the lives of as many individuals as possible and making the environment enabling as opposed to disabling. The other side believes that Universal Design is not an appropriate

mechanism for addressing accessibility criteria. As I understand it, this side feels that this reduces the specificity of architectural design to address particular physical, cognitive, and sensory needs of specific groups (Dearborn, 2015).

Dearborn adds that she is developing a new required undergraduate course titled The Environment and Global Health:

... that will be optional for graduate students but part of a concentration in Health and Well-being. ... Among other topics, this course will address the concept of Universal Design and ask that students understand its purpose as well as debates surrounding the use of the concept in architectural design globally (Dearborn, 2015).

Dearborn is reflecting the trend to increase “design for health and well-being” courses in U.S. architecture programs; courses with UD content are often included in this area of study.

Delivery of UD content

Many programs do not have specific courses, but infuse UD content throughout their curricula where it becomes the responsibility of many professors. For example, Michael Hagge, departmental chair at the University of Memphis writes:

In the Department of Architecture, we believe universal design is an essential element of effective, meaningful design. While we are more likely to provide specifics on universal design in courses such as Construction Documents, Human Factors, and so forth, we teach our students that all design (architecture, interior design, urban design, etc.) should respect the users whomever they might be and whatever their conditions might be (persons with a disability, physically or otherwise impaired, elderly, and so forth). We also teach our students to avoid creating handicaps for people (lack of adequate ramps, lack of truncated domes or other demarcation devices at danger points, lack of lever door hardware, lack of accessible toilet rooms, and so forth). The demonstrated ability to apply this knowledge and understanding is shown through projects in the design studios as well as many of our professional/technical courses. Not all of this necessarily shows up in every student solution to a studio project but it is then the responsibility of the faculty and/or the jury members to make sure these issues are pointed out and, as appropriate, general solutions offered (Hagge, 2015).

To our knowledge, the University at Buffalo (UB) – State University of New York Department of Architecture most thoroughly engages incorporation of UD content in their curricula. At the undergraduate level, students are introduced to UD concepts in their first year in a course titled

American Diversity and Design. Enrolled students analyze physical, sensory, and cognitive disabilities; race and ethnicity; gender; class; and age using theories and principles related to universal design. Subsequent to this course, students are expected to incorporate inclusive goals in their studio work, including the comprehensive studio sequence. At the graduate level, the program offers a Master of Architecture – Inclusive Design degree, which focuses on research and design that enables and empowers diverse populations. This is the only formal architecture degree specializing in UD in the U.S. Affiliated with the Center for Inclusive Design and Environmental Access (IDeA), the program addresses diversity, social justice, social participation, and human performance in a series of studios that are constellated with theoretical and technical seminars. The most subscribed of the four research groups at UB, the Inclusive Design Graduate Research Group has graduated 211 M.Arch. students since 2008. In addition, UB offers a Master of Science in Architecture – Inclusive Design degree, a program for students without an undergraduate degree in architecture. This new degree allows students to develop the knowledge and skills required to conduct research in UD.

Influence of the National Architectural Accrediting Board

The wide range of approaches to universal design education reflects the various approaches and foci of U.S. architecture programs. Although the National Architectural Accrediting Board (NAAB) stipulates Student Performance Criteria for all programs, “it specifies neither the educational format nor the form of student work that may serve as evidence of having met these criteria. Programs are encouraged to develop unique learning and teaching strategies, methods, and materials to satisfy these criteria” (NAAB, 2009). Architecture administrators and faculty members take on UD in much the same way that they would take on required NAAB criteria—individual schools decide if it is part of their curricular mission, and, if so, how it should be addressed.

Of importance is the fact that there is no specific mention of the term *universal design* in the NAAB Student Performance Criteria. However, several items are related to the principles and goals of universal design. In particular, the conditions for accreditation require an understanding of:

- *Historical traditions and global culture*, including socioeconomic, public health, and cultural factors.
- *Cultural diversity*, including the diverse needs, values, behavioral norms, physical abilities, and social and spatial patterns that characterize different cultures and individuals and the implication of this diversity on the societal roles and responsibilities of architects.
- *Human behavior*, including the relationship between the ways humans act, the natural environment, and the design of the built environment.

- *Community and social responsibility*, including the architect's responsibility to work in the public interest and to improve the quality of life for local and global neighbors (NAAB, 2009, pp.21–25).

The student performance criteria also require demonstrated ability in

- *Pre-design*, including the preparation of a comprehensive program for an architectural project that incorporates an assessment of client and user needs.
- *Accessibility*, including the design of sites, facilities, and systems to provide independent and integrated use by individuals with physical (including mobility), sensory, and cognitive disabilities.
- *Life Safety*, including applications of the basic principles of life-safety systems with an emphasis on egress (NAAB, 2009, pp.21–25).

All of these concepts are related to universal design, and, therefore, despite an absence of terminology, many of the basic tenants of UD theoretically should be part of any accredited program, especially if UD is defined as “a process that enables and empowers a diverse population by improving human performance, health and wellness, and social participation” (Steinfeld and Maisel, 2012). The UD goals of body fit, comfort, awareness of critical information, understanding use, wellness, social integration, personalization, and cultural appropriateness are inherently imbedded into the criteria. Referring back to the online survey, this might be another reason for the higher than expected presence of UD in architecture curricula (Steinfeld and Maisel, 2012).

This leads to several questions not addressed in the survey, but worthy of further exploration.

1. If universal design *concepts* are taught in accredited programs, is it important to define them using UD terminology or branding? Further, does UD terminology help or hinder the inclusive components of architectural education?
2. How specifically do programs take on UD issues, and what essential elements are missing?
3. Are instructors already ‘showing rather than telling’ when it comes to UD? If so, then what is the role of UD proponents? If not, should UD issues be established as essential elements of architectural education?

Clearly, additional research is necessary to learn more specifics about what UD components are being taught and how they are being taught. Even more important are studies on what students are learning about UD concepts and whether or not they are able to apply these concepts in architectural practice. In addition, studies about the usefulness of current UD terminology in architectural education are critical, especially given the long-standing confusion about the various terms connected to universal design. All of these topics raise the dilemma facing univer-

sal designers: if UD were fully integrated into architectural curricula and considered a fundamental component of good design, would a special discipline emphasizing its goals and principles be necessary?

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