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Recruiting Engagement through Readings + Media in Architectural Technology Education

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Abstract

The Architectural Technology Fundamentals course has always included reading assignments – usually chapters from a textbook loaded with technical information, data, and a bit of history. In 2020, underpinned by historic shifts in expectations for architectural education, we took a critical look at our teaching and targeted the reading assignment as an opportunity to teach with equity and about equity. The readings have consistently ranked as the least effective learning mode, falling well behind the lectures, hands-on activities, and exams. After unsuccessfully attempting to promote engagement with the readings through quizzes, written outlines, and summaries, we took an entirely different approach. Evolving the assignment involved looking at the history and scope of design-technology and identifying histories and content realms that we have neglected. To expand the scope and timescale investigated in the reading assignment, three major shifts were implemented: diversify formats; provide countering viewpoints; and center “new” information.

The assignment evolved from text-only readings to Readings + Media which now includes text, audio, and visual resources. Based-on the Universal Design for Learning (UDL) Guidelines, we strive to promote student interest and a variety of paths to learning and demonstrating learning. The resources present diverse viewpoints in several ways. First, by providing a diversity of disciplinary perspectives from Landscape Architecture, City Planning, Architecture, Engineering, Science, Medicine, Community Activism, and Art we can begin to recognize the blinders imposed by a single discipline. Second, by selecting underrepresented minority authors on issues of gender, race, and architectural technology, we promote representation of the student body in the bibliography. Third, by offering counterpoints to the pervasive ideals in the architectural academy, students can expose themselves to multiple forms of architectural thinking such as Post-Modernist, Decolonial, and Anarchist thought. After one year, student feedback shows strong support for the new assignment, and students report that Readings + Media is an educationally effective assignment.

Keywords: Pedagogy, Architectural Technology Education

Section I: Issues in the Class

Architectural Technology Fundamentals at California Polytechnic State University is a unique blend of content structured in three areas: construction systems, energy systems, and contextual systems. The class is taken sequentially over three quarters during the second year of the Bachelor of Architecture degree and is followed by three-quarters of Architectural Systems Integration taken during the third year. Together these six courses meet the majority of the National Architectural Accrediting Board (NAAB) 2020 accreditation requirements in Health, Safety and Welfare in the Built Environment (SC.1), Professional Practice (SC.2), Regulatory Context (SC.3), Technical Knowledge (SC.4) and provide the support structure enabling students to achieve Design Synthesis (SC.5) and Building Integration (SC.6)[1]. As a result, the Architectural Technology courses have a tremendous responsibility to cover both breadth and depth, to teach both basic skills and high-level critical thinking, and to provide an educationally efficacious pedagogy where most students can demonstrate ability in the learning outcomes. However, the teaching team struggled to make a positive impact through the course readings, which are usually assigned as homework from a selection of course textbooks

Over the past five years, a team of collaborative instructors have systematically analyzed, critiqued, and revised each aspect of the Architectural Technology Fundamentals courses. The course content was added-to and restructured; the lectures were transformed to include more interactive methods; the exams were completely revamped from computer graded to vignettes that challenged critical thinking; the activities were transformed from a loose collection of tangentially related assignments to highly coordinated assignments that ensure all students are taught agreed-upon fundamentals. Each year, student feedback indicated that these changes worked! However, the teaching team struggled to make a positive impact through the course readings, which are usually assigned as homework from a selection of course textbooks. Due to the high quantity of content in the course, the instructors relied on these readings to fill-in technicalities and specifics. Although we tried many extrinsic ways of motivating students to engage with the readings (usually by earning points toward their grade), year after year, students reported in the end-of-quarter surveys that the readings were not making a strong contribution to their overall learning. *Figure 1: Compiled Learning Modes Survey Responses* illustrates the enduring struggle in the years prior to the 2020-21 academic year. The readings were the lowest ranked learning mode in terms of educational effectiveness. You also see that in the 2020-21 academic year, the student response went up.

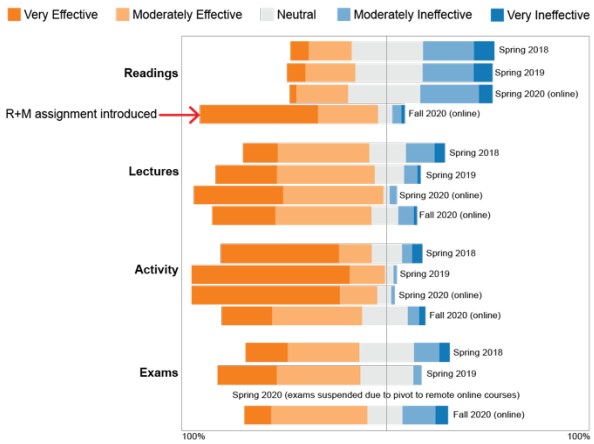

Fig. 1: Compiled Learning Modes Survey Responses. Student responses to end-of-quarter surveys for the 2017-18, 2018-19, 2019-20, and 2020-21 academic years. The question posed was: how effective is each mode of information delivery is at supporting your learning? Students responded on a 5-point Likert scale.

At the end of the 2019-20 academic year, after completing one quarter of emergency online teaching due to the COVID-19 pandemic, the teaching team met with a small group of students to get feedback on how to improve their experience with the course. A student suggested the idea to use the Readings to engage cultural issues and reveal to the students that Architectural Technology is not neutral but is intrinsically

linked to individual and cultural values, economic and labor policies and practices, politics, social structures, and so on. As a result of this comment, the teaching team spent the summer creating the new Readings + Media assignment with a focus on societal, environmental, health and humanitarian issues. The structure for the Readings + Media assignment is based on the Universal Design for Learning framework as a method of structuring the assignment with equity and access at the forefront.

Section II: Issues at Large

As Universities shifted to online education for the remainder for the 2019-20 academic year, news of Derek Chauvin's murder of George Floyd in Minneapolis sent ripples across the country, engaging the public in issues of policing, carceral violence, and demanding the affirmation of the fact that Black Lives Matter. The Architecture faculty at Cal Poly issued a statement on June 18th, 2020, identifying methods of acknowledging and dismantling racial oppression at the home front, the statement called upon the greater community to acknowledge and address how the built environment historically and currently is complicit in systems of oppression. This statement came at a time when members architectural institutions, such as Harvard Graduate School of Design[2] were affirming the goals of the Movement for Black Lives amidst calls to decolonize curriculum and generate a new pedagogy. However, institutions have struggled to move past this. Choosing to adopt decolonization as a metaphor[3] and a vehicle to tack on other social issues as well as avoiding constructing an actively anti-racist architectural pedagogy,[4] the architectural community remains complicit in these systems.

Solutions cannot come about if the architectural community does not recognize the systems that the discipline of architecture, specifically its technologies, are embedded in. Viewing the realm of technology outside of the spheres of society and politics comes from a purely materialistic and determinist mode of thought when it comes to analysis of technologies. In this paper, we point to the definition of technology as defined by Carolyn de la Peña, professor of American Studies, as "the material or systemic results of human attempts to extend the limits of power over the body and its surroundings."[5] Given this definition, we can view technology as another means through which political and social will is expressed and realized on the environment and people. Furthermore, it allows for us to understand that technology acts doubly, upon humans and is influenced by humans. This relationship of society and technology may seem disorienting, however the field of Science, Technology, and Society (STS) Studies elaborates further on these concepts. Layering on architectural technology, we can conclude that "we can no longer view building components as artifacts...or autonomous systems...but part of a much larger system of which architects are one agent."[6] Upon reflection, we realized that our current lens and scope for conversations about technological systems and technics[7] is limiting and centered on a Euro-centric history of the built world, beginning with Greece and Rome, to Europe and the Empire. To engage with a critical history of race in architectural technology, we must study the History of Technology to understand architecture as but one component of a network that forms and is formed by our social and technological values.

In 2004, Bruce Sinclair published *Technology and African American Experience*, a collection of essays on the relationship between race and technology, with a preface on an eloquent case for the importance in weaving race into our approach of the history of technology. Concisely describing our national imagination of science and technology, Racism has, in Sinclair's words "whitened the national narrative" and so too has whitened our technological stories.[8] To explore whiteness, we must raise the subject. Yet bringing it up poses a challenge for

professionals and academics who have traditionally dealt with artifacts of record that overwhelming take on a graphic and spatial mode of existence. Studying whiteness means working with evidence more interpretive than tangible, it requires the analysis of language, intent, and the motivation of subjects that have been excluded from a disciplinary narrative. It requires consulting a wider range of archives and disciplines to include the subjects that have been considered "outside history" and therefore whose records have not been considered worthy of preserving. Expanding the archives of what is studied in architecture in this way allows us to give agency to the non-architect as a critical agent, a shaper and progenitor of practices, in the system of architectural technology, not just as a recipient or victim of its operation.

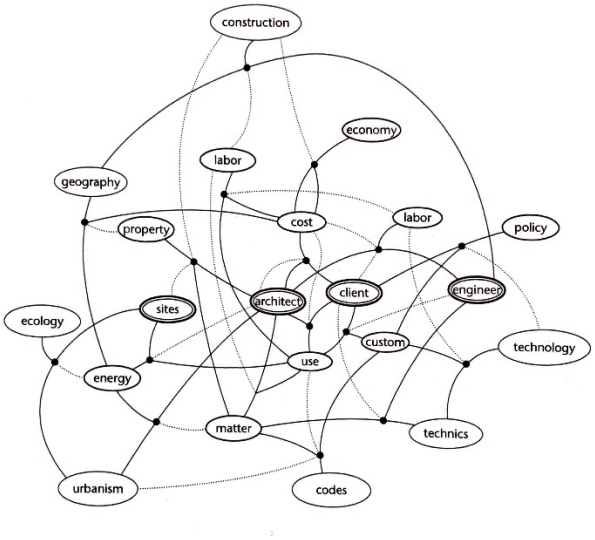

Fig. 2: Diagram representative of the systemic relationship between human and non-human agents, with the architect as a central figure. From "Building Systems" Actar Press, 2012.

Section III: Methodology of New Assignment

Having identified the two-fold weaknesses in our current pedagogy and curriculum with low student engagement and low learning efficacy with the readings, and a need to begin the process of opening the course to new histories and narratives, we strategized three design approaches for the Reading + Media (R+M) assignment which are described in this section: diversify formats, position countering viewpoints, and center "new" information. The team of instructors and the student co-author collaboratively developed a weekly assignment format which includes a selection of 3 to 5 mixed-media resources, a 50-minute peer discussion, and a weekly survey which is graded complete/in-complete.

Diversify Formats

The design of the assignment itself should also embody a change in thinking away from dogmatic approaches that favor one way of thinking over another, to a more open and inclusive format that elevates ideas of equity. Through chance, our team learned about the Universal Design for Learning (UDL) Guidelines which encourages and rewards individual exploration and provides a more even field to students of different learning tendencies and experiences.

Universal Design for Learning (UDL) is a framework that has been successfully used in K-12 education and is now also growing in use at community colleges and universities. Each student has diverse ways of thinking, learning, and demonstrating their knowledge, and therefore classes that are organized around one method of content delivery and student learning assessment does not provide an equitable situation within which all students may thrive. Common barriers to learning include differences in what attracts student's attention; differences in knowledge, skill, and experiences; struggles with one type of content, such as text only, or video only; struggles with motivation; struggles with independence; and disabilities. The UDL Guidelines are organized into three main categories: Providing Multiple Means of Engagement, Provide Multiple Means of Representation, and Provide Multiple Means of Action & Expression as shown by the color-coded columns in Figure 2. These three education-design strategies help

instructors generate ideas for how to address common barriers to learning.

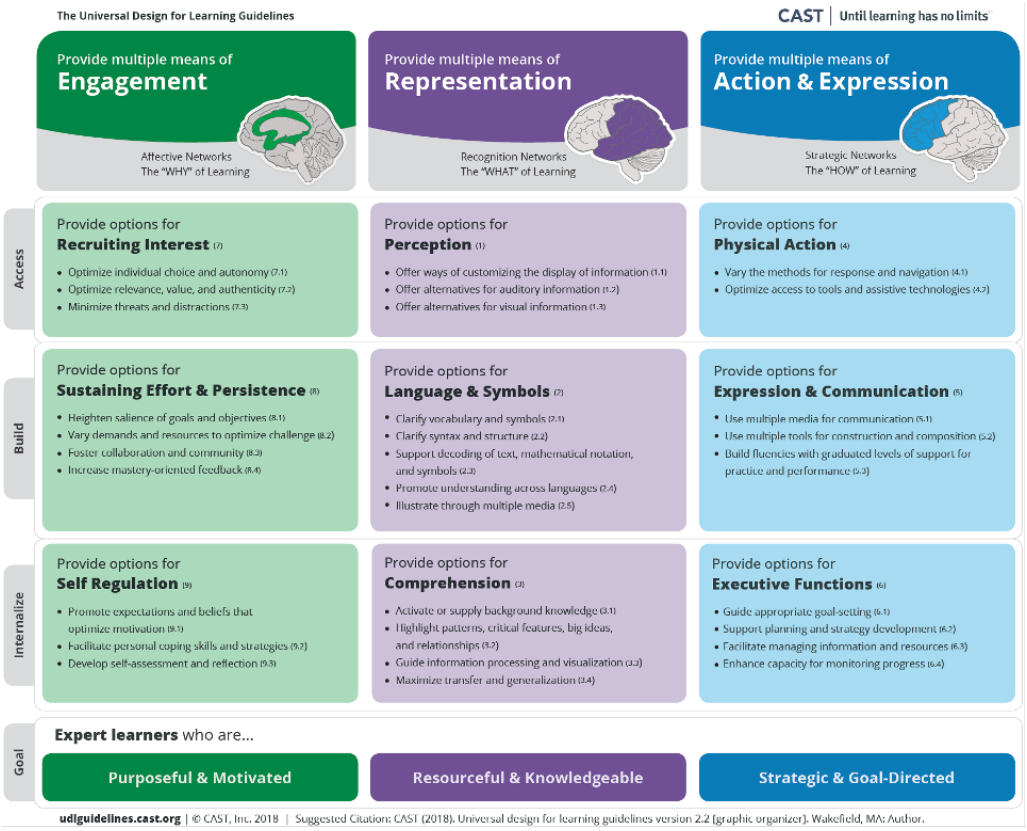

Fig. 3. Universal Design for Learning (UDL) Guidelines matrix describing educational strategies grouped into three categories. by CAST, Inc.

The Readings + Media employs at least three UDL strategies. In the category of Representation: Perception, the Readings + Media assignment offers students choice. Students choose the media format, from text, audio (e.g. podcasts), or video (e.g. TED Talks, documentary films). During a focus group discussion with current students, one student shared that she always selects the text-based medium because she is currently taking all her classes online and wants a break from the audio and video input. Other students shared that they choose a podcast because they want to spend some time outdoors engaged in physical activity such as walking as a welcome break from many hours of screen time. Another student shared that he is dyslexic and having the option to watch a video or listen to an audio resource saves him the frustration of reading and re-reading text over and over. Another student shared that with a history of concussions, she has difficulty reading small text, and therefore sometimes decides on which text resource to choose based on the percentage of text to white-space on the page. One student almost seemed to confess that he selects the media which he can complete fastest. The student feedback expresses some of the many reasons that students selected the medium, many of which the

teaching team hadn't ever considered before. Hearing this feedback illuminated the challenges that assigning only textbook readings created for many students in the past.

The UDL strategy of Engagement: Recruiting Interest was of high importance to the teaching team, as year after year we explicitly saw low student engagement with the textbook readings. Again, providing a lot of student choice was key to this strategy. In addition to providing choice in the media type, we attempted to provide a variety of content categories, such as critical theory, current news, interviews, presentations, research papers, industry publications, third-party publications, pop-culture, etc.... Students select the resource type based on their personal interests, or in some cases, something they do not know much about and wish to expand their knowledge of. In our focus group conversation, one student remembered reading a Continuing Education article from ThinkWood.com about the sustainability of wood building systems. He noticed that the organization is sponsored by the Softwood Lumber Board. He questioned the objectiveness of the article and noted the role of material and product industry in professional architectural education after school, which brought pause. The following week he read a chapter by architectural writer, Kiel Moe, about how we need to completely re-think our relationship to building materials as materials and not products. He appreciated two opposing points-of-view and was able to identify in himself his values, interests, and things to be mindful of when engaging a resource.

The third UDL strategy is Engagement: Sustaining Effort & Persistence, which we achieve through weekly small group peer discussions. Especially in the online course format, students report feeling disconnected from their peers. While it was difficult to do so, we carved out one hour of class time, from our four synchronous hours, to dedicate to Readings + Media discussions each week. One instructor and student instructional assistant (ISA) meet with student sections of 20 students, currently over Zoom, but a practice we hope to continue in person in the future. After a short introductory conversation, students separate into Breakout rooms. Each quarter students select 3 to 5 classmates to become well-acquainted with through peer conversations. During our focus group conversation, one student commented that the discussion is a highlight of her week. It is one of the few times she can have an informal interaction with her peers. Other students indicated that they would like to have more input from faculty and ISAs in the small groups to help the students move the conversation into realms that they may not know about yet.

During the first year of the Readings + Media assignment, we strongly believe that the three education strategies influenced by UDL have been very positive. Further analysis of this conclusion will be shared at the end of this paper, supported by student survey results.

Position Countering Viewpoints

While the Reading + Media assignment structure encourages personalized and flexible learning, the content of the Reading + Media assignments aims to provide differing and sometimes competing lenses through which the weekly topic is viewed. While this may seem like a barrier to understanding a topic, the intention is to encourage students to grapple with the various perceived benefits of a system, object, or design choice and the examples of the drawbacks or harm created from that choice. When we were not able to provide competing sources within the assignment, the assignment as a whole would be positioned to critique or qualify the topic of the week. In the focus group discussion, two students pointed to this as a strength of the assignment as it encouraged livelier discussions with their peers as opposed to when positions of the sources, and hence the students, were in agreement. One approved of this trait of the assignment by describing architects as generalists

that must have a large breadth of knowledge. Another student noted her appreciation for assignments with cross-disciplinary sources, stating that it is inspiring to see how the practice of architecture is understood by other disciplines and how the work of an Architect affects/is affected by other disciplines. Countering positions in the Reading + Media assignments encourages students to think critically about what they value and to shape their personality as a designer, namely, a designer who is not neutral towards architectural technology.

Center "New" Information

The creators of the Reading + Media assignments worked diligently to find sources that speak of issues in technology and society by those who are affected by it or have an expertise in the issue at hand. It must be noted that this strategy was unable to be implemented in all assignments due to our own "newness" to these issues, and lacking quality and quantity of available resources that are appropriate for second year undergraduate students and met our assignment goals. We made explicit the positionality of each resource by stating the author of the source and their discipline or institutional memberships when applicable. Paragraph descriptions of the argument and position of the text were provided with each source in order to orient students to the choices for that week. The motivation for this decision was to combat language found in discussions of technology where the discipline is viewed as a rational field that is devoid of what can be viewed as a capricious and problematic nature of human agents. This is described in Sandra Harding's "God Trick" or the view from nowhere.[9] If the intention of the God Trick is to seem as if we are situated beyond societal issues and that the information is objective and devoid of people, then to combat this we must tell the story of whose knowledge it is and who the producers of the knowledge are. Our goal of combating this issue comes from our belief that conversations of the "new" or issues of the contemporary regarding race and society are rarely new but rather, at the time of discussion, are only just being incorporated into the contemporary disciplinary conversation. Rather, the discipline in question has lacked the language, or motivation, to allow for the "new" conversations to occur or be viewed seriously.[10] For this reason, respect should be given to the field of study or author from where/whom the knowledge originated from. This manifests in the ways already mentioned such as the summary of argument and position provided with sources but as well as referencing Black, Indigenous, and people of color authors and varying geographies of sources. This centering of the "new" allows for students to recognize how architectural technology is but one component of larger networks in which it participates.

Section IV: Sample Assignment

Included below is an example Reading + Media assignment to demonstrate how the above strategies and ideas are implemented. The following assignment was issued in week five of the second (winter quarter) of three courses in the Architectural Technology Fundamental series.

Reading + Media 05: Site Circulation

This week in the course, students were working in the Site and Contextual Systems Module where they learn strategies and concepts related to understanding, analyzing, and manipulating sloped and unbound site conditions that have been selected for their design studios. The lecture content covered methods of navigating around a site condition and understanding site slope and drainage; the activity asked students to analyze a site's topography, hydrology, and climate and to manipulate the site to respond to certain design goals. The following Reading + Media assignment aims to preface these learning objectives by providing examples of the different methods that people and societies relate to land and how its manipulation affects geographic and

cultural conditions. The three sources are listed as follows in an annotated bibliography format.

Resources

> Mowarin, Tyson, dir. Connection to Country: Stories from Indigenous People From The Pilbara. Australia: Weerianna Street Media Company, 2017. Video documentary film accessed from Kanopy.com. Excerpts: Introduction and Petroglyphs: 0:00-10:40; Aboriginal Heritage Rights: 13:24-20:40; Aboriginal Relationships to Country: 30:09-47:26.

Told by and from the point of view of Indigenous Australian Peoples, this documentary follows people from the Pilbara as they battle to preserve Australia's unique cultural heritage from the ravages of the booming mining industry that has been encroaching on the land as a result of land development. This documentary contains various interviews with members of aboriginal groups and contains mentions of "country." The term “country” is often used by Aboriginal people and Torres Strait Islander people to describe family origins and associations with particular areas of so called “Australia.” For example, a Gamilaraay man from south-west Queensland might say “The Narran lakes area is my country”, or “I am a Simpson from Gamilaraay country.”

> Corntassel, Jeff. “How Will Land Recognize You? Regenerating Indigenous Relationships Amidst Reconciliation Discourses.” and Cindy Holder. “Indigenous Peoples’ Human Right to Land.” September, 2019, Queens University, Brisbane, Australia, Audio Podcast. 0:00-19:47, 41:22-65:48; https://www.stitcher.com/show/indigenous-land-rights-and-reconciliation-podcast/episode/episode-2-changing-the-paradigm-66757732

The selected interviews are paper presentations from Queen University (Ontario, Canada) conference in September 2019 that worked to address the lack of land return to Indigenous people amid a larger movement to return cultural artifacts. Situated in Canada, the two presentations speak of how settler nation-states such as Canada and the United States can and must recognize the original and rightful caretakers of land.

> Dripps, Robin. “Groundworks.” In Site Matters: Design Concepts, Histories, and Strategies, edited by Carol J. Burns and Andrea Kahn, 60-91. New York: Routledge, 2005.

This essay from Site Matters, a comprehensive set of essays on understanding site conditions and relationships, elaborates upon the human history of the land, namely the ground itself, and how it has occupied social imaginaries. The text goes onto speak of the quality of ground, its composite and shifting nature, and then provide ways that design situated on the ground can engage with it.

Reflections

Out of 137 students, 65 (47%) selected Connection to Country, 34 (25%) selected the Queens University lecture recording, and 38 (28%) selected “Groundworks.” Students reported overall positive feedback, many appreciating the variety of cultural contexts the sources pulled from, having not received prior education on Indigenous Land Back movements. Students from two design studios noted the sources’ connection to their own studio project, being sited at an abandoned copper mine in Ajo, Arizona and along the US-Mexico border. They pointed out that the sources caused deep reflection on the impact of their own design studio work on landscapes characterized by their respective extractive and violent imperial histories as well as on the perceived value of the land from differing viewpoints.

Section V: Feedback and Revisions

We have [nearly] completed one academic year with the new Readings + Media assignment. In the Architectural Technology Fundamentals courses, we have an on-going practice of soliciting feedback from students at the mid-point of each quarter, and at each quarter's end. We also periodically incentivize students to take-part in 1-hour long focus group discussions once per year. As a result of this student feedback, we regularly make changes to the course delivery approach. At the beginning of this paper, student survey responses that we collected and analyzed was presented as Figure 1. Throughout the paper, students have been paraphrased based on their verbal comments made during a focus group discussion held on April 30, 2021.

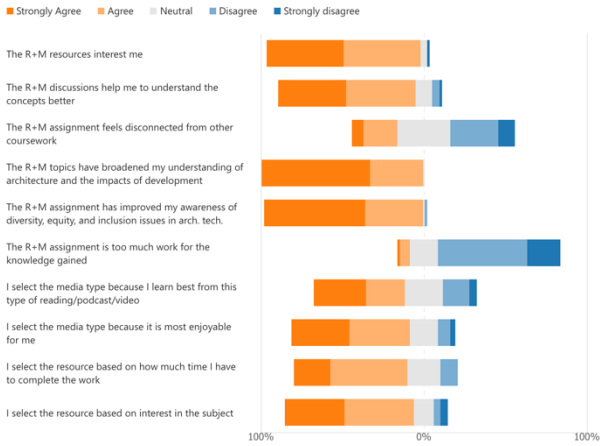

Fig. 2. Student survey responses from Fall 2021. There were 69 student responses out of approximately 150 students. Students were asked to rate their agreement with the following statements in regard to the newly redesigned Readings + Media assignment.

Beginning in Fall quarter, we introduced a new line of questions into the survey to collect more specific feedback about the Readings + Media assignment. One of the initial issues we faced was low student engagement and interest. In Figure 2, there is evidence of significant improvement in this regard, as shown by the high rate of strongly agree and agree to the statements: The R+M resources interest me (top of list), and I select the resource based on interest in the subject (bottom of list). Student also indicate a strong alignment with the statements: The R+M Topics have broadened by understanding of architecture and the impacts of development (fourth item in list), and The R+M assignment has improved by awareness of diversity, equity, and inclusion in Arch. Tech (fifth item in list). While the language of this survey is not an exact match to the language used in this paper outlining the goals and educational strategies employed in the redesign of the R+M assignment, we feel that the student responses still provide valuable feedback that these changes have led to an overall positive student learning experience, and that we are making progress toward the goals.

The past year has allowed us to be reflective, and to also change our perspective on what is essential for students to learn. In the Architectural Technology Fundamentals course at Cal Poly, we are changing course from thinking of our content as neutral. Especially in terms of societal and cultural issues, we have embarked on a period of growth and learning. We feel compelled to contribute to the new wave of civil rights activism. Education has a responsibility to give students a broad spectrum of voices and perspectives, so that they are first aware of architecture's role in systems of all kinds, so that they are able to internalize and consider opposing viewpoints, and so that they may be empowered to do the work of rebuilding the aspects of the profession that perpetuate oppression and destruction. The Readings + Media assignment has allowed us to enrich the lectures and activities, in which more precisely technical content is learned.

Notes

[1] National Architectural Accrediting Board, Inc. Conditions for Accreditation, 2020 Edition. Section 3: Program and Student Criteria. P. 3

[2] See "Notes on Credibility" by Harvard GSD African American Student Union (AASU) and AfricaGSD at https://notesoncredibility.cargo.site and subsequent response from Dean Sarah M. Whiting "Towards a New GSD" at https://www.gsd.harvard.edu/2020/06/toward-a-new-gsd-a-letter-from-dean-sarah-m-whiting

[3] Eve Tuck and K. Wayne Yang, "Decolonization is not a metaphor," *Decolonization: Indigeneity, Education & Society* 1, no. 1 (2012): 1-40.

[4] Cruz Garcia and Nathalie Frankowski, *A Manual of Anti-Racist Architecture Education* (Blacksburg: Loudreaders Publishing, 2020), https://waithinktank.com/Anti-Racist-Education-Manual

[5] Carolyn de la Peña, "The History of Technology, the Resistance of Archives, and the Whiteness of Race," *Technology and Culture* 51, no. 4 (October 2010): 925

[6] Kiel Moe and Ryan E. Smith, eds., *Building Systems: Design Techology and Society* (New York: Routledge, 2010), 4.
[7] A term defined by Lewis Mumford, American philosopher of technology, that describes the relationship between technological and societal systems that manifest in the individual and system-wide habits of a civilization.

[8] Bruce Sinclair, "Integrating the Histories of Race and Technology," in *Technology and the African-American Experience: Needs and Opportunity for Study* (Cambridge, Mass.: 2004), 2.

[9] The God Trick is described by Donna Haraway, feminist and postmodernist, as a "view from nowhere" that encourages a reading of knowledge derived in a systematic and often scientific method to be understood as collected from an observer free of human subjectivity or beyond the human realm, therefore making the knowledge itself devoid of human conditions such as bias, prejudice, or misreading. In the foundational text, Haraway argues that this trick makes it extremely to speak of humanity and their culture in conversations about scientific knowledge and ideas rationalized by it. Haraway, Donna, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies,* 14 no. 3 (Autumn, 1999). 575-599.

[10] For more on this phenomenon of clean language (technoscientific language), see Carol Cohn, "Sex and Death in the Rational World of Defense Intellectuals," *Signs: Journal of Women in Culture and Society* 12, no. 4 (Summer, 1987) 690-692.

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