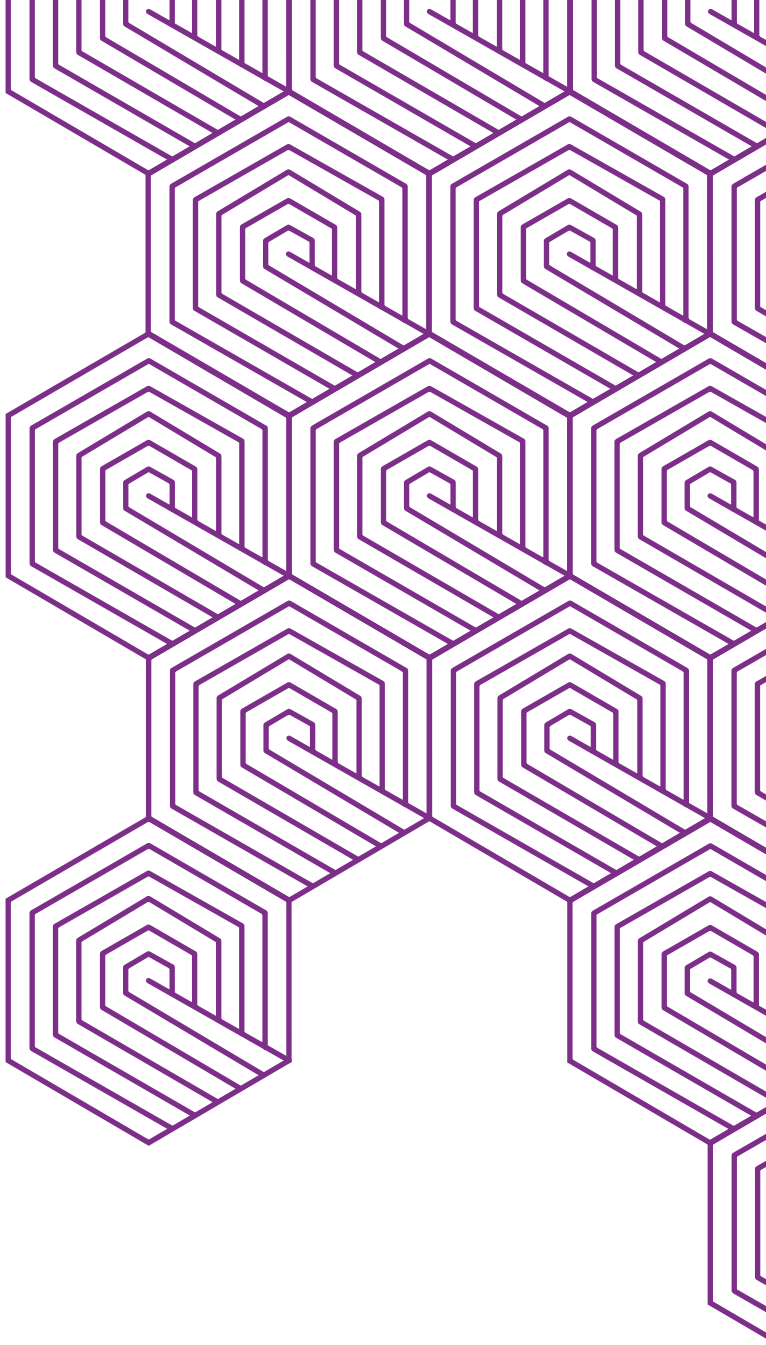
IDENTITY-INCLUSIVE COMPUTING (IIC)

A look into identity-inclusive computing (IIC), focused on students traditionally excluded based on factors such as race, ethnicity, gender, sexuality, disability status, and class.

AIICE
ALLIANCE FOR IDENTITY INCLUSIVE COMPUTING EDUCATION



Identity-Inclusive Computing (IIC)

How identity (i.e., race, ethnicity, gender, sexuality, ability, socioeconomic status, and their intersections) impacts and is impacted by computing.

Washington, A.N., 2020; Washington, A.N., Daily, S. & Sadler, C., 2022

Context

Computing is not culturally neutral (D'Ambrosio, 1985). Computer science (CS) is not currently and has never been immune to the social, political, and economic influences of the culture in which computing takes place. Therefore, a CS education based on the myth of CS neutrality is incomplete and has broad consequences for the discipline and society, including a workforce that lacks the cultural competence to understand the historical and social inequities that influence the development of unethical and problematic technologies. AiiCE is working to cultivate a more competent CS field and tech workforce by focusing on people, practice, and policy.

Alliance for Identity-Inclusive Computing Education

The Alliance for Identity-Inclusive Computing Education (AiiCE) is a national cross-sector partnership formed to increase entry, course and degree enrollment, retention, and completion rates of high school and post-secondary students from groups that are historically marginalized and excluded in computing based on identity (i.e., race, ethnicity, gender, sexuality, disability status, and class). AiiCE's goal is to develop higher-quality CS courses, more effective CS educators, and the local, state, and institutional policies needed to support both.

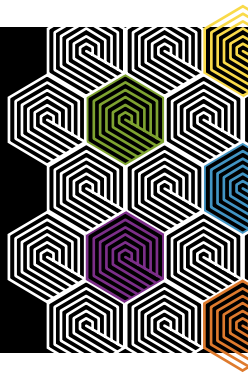
High-Quality CS Ed

The quality CS education is often determined by the assumed pedigree of an institution alone rather than by the quality of the courses' content and instructional methods. AiiCE challenges this and suggests the definition of high-quality CS must include accurate, effective, engaging, and historically literate CS curriculum; the instructional competence of CS educators, of which cultural competence is a basic requirement; and anti-oppressive learning environments that support – rather than hinder, as is the present case for many marginalized students – the CS identity development of all students.

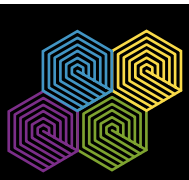
Why the focus on IIC?

First, research has established the importance of cultural competence, identity, and a sense of belonging to students' learning outcomes and persistence in education (Muniz, 2019; Madkins, Howard & Freed, 2020; Morales-Chicas et al., 2019). Drawing on students' prior knowledge and experiences increases comprehension and processing of new information. Fostering school connectedness and the development of intellectual identity (for example, as a computer scientist or technologist) improves attendance, interest in school, and academic achievement. Students having the knowledge and skills to analyze CS disparities and challenge the debunked racist, sexist, classist, and ableist narratives regarding uneven CS aptitude and interest across identities is likely to improve engagement (Godfrey, Santos & Burton, 2017).

If the field is serious about tackling the exclusion and dysfunction undermining K-12 CS education, CS college departments, and the tech workforce, AiiCE posits that IIC is a necessary tool to do so.



Despite decades of efforts to diversify CS, the field remains overwhelmingly white and Asian, able-bodied, middle-to-upper class, cisgender men, misinterpreting "preparatory privilege" as natural ability or "the geek gene" (Margolis et al., 2017).



The current state of the field is not the natural order of CS. Results have been engineered.

K-12 Access

Black, Native, and Latinx students are less likely to attend K-12 schools offering foundational CS courses and have less access to AP courses (Koshy et al., 2021; Wyatt, Feng & Ewing, 2020). K-12 programming tools are often inaccessible to disabled students (Stefik et al., 2019).

Extraction Then Exclusion

Tech innovations now taken for granted, like speech-to-text, were developed for and by disabled people; and yet, most websites and other tech built on their labor and from their needs are not fully accessible (Al Heeti, 2021). Disability data is often not even reported in tech companies' workforce diversity reports (Blaser et al., 2019).

Postsecondary Elimination

Black, Native, and Latinx students who bypass these obstacles and choose to major in CS are often terrorized out of those departments. Black students have the highest attrition rate among those who leave CS majors. Black CS PhD students are the least likely racial group to graduate within 6 years of entering the program (Waisome, Jackson, & Gilbert, 2020). While the racist and expedient excuse is a lack of preparation or lower skills, Black students are reporting leaving STEM majors due to racial animus, hostility, and sabotage from professors, advisors, and peers who exclude them from course requirements like lab groups and collaborative projects (Lee et al., 2020; McGee & Bentley 2017; Dee & Gershenson, 2017; Scott, Klein & Onovakpuri, 2017).

Manufactured Exclusion: CS Identity

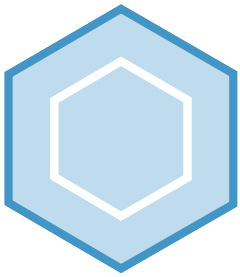
Computing was once considered women's work (Digital Futures Society, 2021).

But as the power and earning potential of computing became more apparent, white men guarded those positions for themselves. The image of a white male as the quintessential computer scientist is the result of privilege, access, and the work of advertising companies looking to recruit more men to the field – not a reflection of natural aptitude (Rankin, 2018; Little, 2021; Mihm, 2017; Thompson, 2019).

This demonstrates that the CS field does understand the importance of identity and a sense of belonging. It is evident in the considerable effort and resources invested in creating the myth of white male aptitude for CS, protecting space for them, and excluding others from that space. False narratives about skill and interest being unevenly distributed across groups were created and deployed to bolster the myth and obscure the source of the discriminatory and exclusive state of CS as a field and workforce. Resources and effort must be invested to undo the harm caused by these myths and lies and reconstitute a CS identity that reflects the truth.

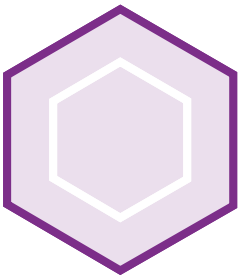
IIC in Practice, People, and Policy

And so, AiiCE will empower the next generation of computer scientists by creating equitable and inclusive CS environments for students and educators of all backgrounds and identities. AiiCE is doing this by blending aspects of social science with CS and focusing on the people, practices, and policies that can destroy barriers to high-quality CS education.



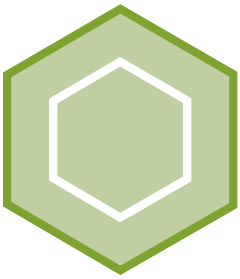
Practice

Support CS educators and leaders in fostering academic cultures that are more inclusive of non-dominant identities.



People

Increase CS student and educator knowledge and use of identity and related topics (e.g., race, power, bias, discrimination, accessibility, and oppression).



Policy

Increase K-16 policy-driven changes to CS education that infuse identity-inclusive strategies.

AiiCE's work focuses on the following three priority areas across K-12 and postsecondary education systems. A fourth priority area, Research, supports the planning and execution, codifying of proven practices, and collection of lessons learned across all areas of the work.

Curricula & Pedagogy: Developing innovative identity-inclusive educational methodologies and best practices in K-16 computing education.

Professional Development: Identity-inclusive computing (IIC) training activities for K-16 CS educators, administrators, and university teaching assistants.

Policy: Creating institutional, structural, and systemic changes across K-16 computing education via resource development and advocacy.

IIC Tenets

The following pages introduce IIC tenets in each of these priority areas. Drawing inspiration from the work of culturally-responsive computing (Scott, et al., 2015), the Culturally Responsive-Sustaining CS Education Framework (Davis, et al., 2021), the CSTA Landscape Survey (Koshy et al., 2021), and universal design in computing education (Burgstahler, 2011), these tenets guide strategic planning, resource allocation, and collective action to increase the representation, power, and protection of marginalized people in CS.

The tenets introduced on pages 11, 16, 20, and 21 were created in a separate development process in 2022 by the AiiCE steering committee and partners with input and guidance from the advisory board and other community members. In this brief, we attempt to move from the theoretical to the practical by presenting each tenet with explanatory text and providing indicators as examples of what might be observable or measurable in an environment to indicate that the tenet is active. Please note that these indicator lists are incomplete and presented as a starting point to support the CS education ecosystem in moving from motivational speech about equity and broad calls for action to discrete and concrete expectations for outputs, results, and collective accountability.

This information will be refined, updated, or corrected over the lifecycle of this grant. As the community experiments, validates new practices, and generates new ideas for breaking through barriers, the new learning will be archived in this collection of knowledge and practice.

Priority Strategy 1: Curricula & Pedagogy

And so, AiiCE will empower the next generation of computer scientists by creating equitable and inclusive CS environments for students and educators of all backgrounds and identities. AiiCE is doing this by blending aspects of social science with CS and focusing on the people, practices, and policies that can destroy barriers to high-quality CS education.

Curricula & Pedagogy IIC Tenets:

a. Inclusive and equitable CS classroom cultures that are co created to ensure meaningful learning experiences and a sense of belonging for all students.

b. Pedagogy and curricula that are aligned to appropriate standards and authentic to students' experiences, interests, and cultures.

c. Student voice, agency, self-determination, and advocacy that are valued, encouraged, and incorporated throughout the learning process.

d. Families and communities (including their cultures and assets) who are incorporated into the design of learning opportunities.

e. A range of experts who are incorporated into learning opportunities (including researchers and community members).

f. Curricula that address the social legacy of the uneven impacts of CS.

CPIIC1. Inclusive and equitable CS classroom cultures that are co-created to ensure meaningful learning experiences and a sense of belonging for all students.

CS educators may not share identities, backgrounds, or experiences with all their students. Therefore, educators must collaboratively design CS education and learning environments with students, such as the provision of formative feedback opportunities on classroom climate, instruction, and curriculum. The intended results are that students feel welcomed and valued, can make connection between their identities and the curriculum, and actively participate in the learning environment. Inclusive instructional practices must be the default.

Indicators:

a. Educators and students share high expectations for all students' abilities.

b. Classrooms norms are co-created, iterated, and agreed upon by both educators and students to hold each other accountable for maintaining a classroom community.

c. Students provide regular feedback on the class content and instructional practices; the educator uses this feedback to adjust her instructional practices and pedagogy and communicates to students the adjustments made.

d. CS lessons incorporate skill building and modeling of student voice, agency, and advocacy.

e. Assessments include student self-reports of self-esteem, self-efficacy, sense of belonging and computing/technologist identity development (with burdens of the myth of meritocracy removed).

f. Anti-oppressive and identity-inclusive spaces are a requisite (not add-on) and included in evaluation, promotion, and bonus decisions.

CPIIC2. Pedagogy and curriculum that are aligned to appropriate standards and authentic to students' experiences, interests, and cultures.

CS curriculum is often developed with a "default" student in mind, one who is typically a white, cis-hetero, male, able-bodied student. While curriculum vendors, state and district selection committees, and educators must ensure alignment to appropriate academic and professional standards, they must also ensure authentic representation across students' identities, experiences, interests, and cultures.This representation should be interwoven throughout the curriculum and core content.

Indicators:

a. Relevant disability, accessibility, and inclusive design content are incorporated into curricula and other materials.

b. Any software or tools used in the course are accessible.

c. Course materials, readings, assignments, and lectures reflect pioneers, inventors, technologists, computer scientists, and researchers across identities, experiences, and cultures.

d. Course materials, readings, assignments, and lectures reflect a wide variety of topics that would appeal to identities, experiences, and cultures.

e. Instructional practices reflect UDL (Universal Design for Learning) and educators incorporate the most effective strategies in the UDL4CS Interactive Table for all students.

CPIIC3. Student voice, agency, self-determination, and advocacy are valued, encouraged, and incorporated throughout the learning process.

While co-creating CS classroom culture requires student voice and agency, this tenet speaks to the need for that input to permeate the learning process and happen continually.

Indicators:

a. Norms and expectations around utilizing student voice and agency are reflected in the co-created classroom culture.

b. Processes and avenues for providing feedback are identified and stored in a shared location.

CPIIC4. Families and communities (including their cultures and assets) are incorporated into the design of learning opportunities.

In most instances, families – however students define them – will be students' greatest advocates and educators' best allies. Co-creating classroom community must extend to students' families. Students share their enthusiasm and excitement about CS and tech with their communities, so the curriculum should be relevant to their families and communities as well as value their expertise about their student's passions, interests, and strengths.

Indicators:

a. Culturally responsive, accessible, and inclusive family and community engagement strategies are built into learning opportunities.

b. Bidirectional feedback is collected and shared at regular intervals, allowing for equitable input from interested families and community members.

c. An opt-in model is implemented for engagement to avoid extractive or exploitative relationships with families and community members.

d. Where effort or partnership in designing learning opportunities is significant, participating families and community members will be compensated.

CPIIC5. A range of experts who are incorporated into learning opportunities (including researchers and community members).

Expanding the definition of relevant expertise and diversifying the field of experts students may interact with can increase engagement and facilitate students' CS identity. Experts should span a broad array of schools of thought, computing-related fields, occupations within those fields, and identity groups.

Indicators:

a. Deliberate cultivation of CS experts who reflect the diversity of topical interests of students.

b. Inclusion of a pool of CS experts that reflect the range of identity groups within the class.

c. CS experts are prepared by the teacher to engage with student interests and current skill sets to ensure relevant participation of experts in classroom learning.

d. CS experts are vetted and trained to contribute to a safe productive and supportive learning environment.

CPIIC6. Curricula that address the social legacy of the uneven impacts of CS.

To understand CS content knowledge and how that knowledge is produced, students must understand the social, political, and economic contexts in which computing developed. This context is also vital to developing critical thinking skills and problem-solving skills foundational to computational thinking; students cannot critically analyze within a vacuum and without context.

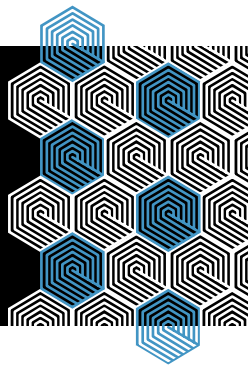
Indicators:

a. Lessons and assignments cover CS topics robustly, including the surrounding context of discoveries, publishing, plagiarism, credit given or denied, etc.

b. Students are equipped to perform critical CS tasks and skills, and students understand the context for the development and the prioritization of these critical CS skills over other skills.

c. Students understand the value of and can build accessible technology that addresses social issues.

Priority Strategy 2: Professional Development



AiiCE is providing formal and informal professional development (PD) on IIC topics for CS educators (high-school and postsecondary) and teaching assistants (TAs). Participants are studying how topics such as identity, intersectionality, and systemic disparities across historical trends have impacted organizational cultures and computing environments and innovations. Note that there is intentional intersection and overlap across strategies. The PD activities here focus on building the competencies (i.e., knowledge, skills, dispositions) needed to develop IIC courses, modules, and CS postsecondary department activities.

Professional Development IIC Tenets:

a. Definitions of identity (e.g., race, ethnicity, gender, class, sexuality, and disability), intersectionality, oppression, power, and other relevant concepts.

b. Examination of disparities related to identity (racism, sexism, xenophobia, classism, ableism, homophobia, transphobia, and more) and how they're reflected in CS education & the tech industry.

c. Reflection on the current state of IIC in schools, departments, and other institutions.

d. Support for the development of pedagogy and/or practices that lead to antioppressive and identity-inclusive spaces.

e. Guidance to develop or adapt identity-inclusive curricula and assessments.

f. Strategies to empower individuals to enact change.

PDIIC1. Definitions of identity (e.g., race, ethnicity, gender, class, sexuality, and disability), intersectionality, oppression, power, and other relevant concepts.

Definitions of IIC-related terms are complete, researched, and historically literate to provide accurate terminology for learning CS in a critical manner. Basic understanding of these terms and how they operate in CS contexts specifically is necessary for competent application of IIC, including relevance of content and instructional strategies and student engagement.

Indicators:

a. Definitions of IIC-related terms are robust (i.e., complete, accurate, historically literate).

b. Participants personally explore and assess definitions of IIC-related terms as it relates to their own identities, privilege(s), and power.

c. Definitions of IIC-related terms are cross-referenced with CS examples or defined within the context of a CS topic so educators can regularly use terms within their instruction (e.g. algorithmic bias).

d. Educators enlist student opt-in support to help iterate definition of IIC-related terms by providing feedback of new or updated definitions while in their classrooms.

PDIIC2. Examination of disparities related to identity (racism, sexism, xenophobia, classism, ableism, homophobia, transphobia, and more) and how they're reflected in CS education & the tech industry.

Critical analysis of the creation and perpetuation of disparities in CS (i.e., who is responsible for creating and maintaining disparities, for what purpose, who benefits from maintenance of these disparities and how, etc.) is presented during PD as critical content. Skill development to perform critical analysis of IIC-related topics (e.g., AI ethics) is a major focus of IIC training.

Indicators:

a. Participants are able to identify CS disparities, their causes, and define related terms.

PDIIC3. Reflection on the current state of IIC in schools, departments, and other institutions.

Awareness of CS disparities and the critical analysis skills to identify them and their root causes is applied to participants' specific contexts.

Indicators:

a. Participants are able to identify CS disparities in their school department or institution.

b. Participants are able to produce a theory and supporting evidence for causes.

c. Participants are able to sketch at least rudimentary solutions (even without implementation and sustainability considerations identified).

PDIIC4. Support for the development of pedagogy and/or practices that lead to anti-oppressive and identity-inclusive spaces.

Release time, funding, and materials for follow up support (e.g., instructional coaching) and continuing education credit opportunities are necessary to effectively apply and monitor the results of IIC PD.

Indicators:

a. Disability-related issues are incorporated and individuals with disabilities are engaged as experts.

b. Funding is earmarked for IIC PD, including trainings, coaching, follow up consultation with trainers, and participation in a peer learning community.

c. Intentional and inclusive recruitment practices that remove barriers for students historically marginalized in CS are addressed in training and progress monitored in follow up coaching activities.

d. PD offerings are vetted and updated to ensure IIC is embedded across: objectives and outcomes, training facilitation approaches and materials, and course materials offered to participants.

PDIIC5. Guidance to develop or adapt identity-inclusive curricula and assessments.

Implementation materials are provided to support application of IIC PD in discrete work tasks post-training.

Indicators:

a. Examples of IIC curricula and matching assessments are provided.

b. Examples are annotated to clarify CS relevance, applicable CS competencies, and the metacognitive skills required to recreate the examples in the participant's work.

c. Professional development introduces teachers to culturally competent lessons in the curriculum and incorporates a modeling and role-playing approach to teaching and learning computing concepts and IIC pedagogy.

PDIIC6. Strategies to empower individuals to enact change.

Effective PD trainings require actionable strategies that will be feasible to implement in participants' current contexts and are within their current level of support and agency. In addition to being CS content-specific for relevance and applicability, feasibility and application are vital criteria in designing, framing, and delivering effective training.

Indicators:

a. Meetings, workshops, and other events are designed to ensure accessibility.

b. Strategies are described, supported with research and evidence where applicable, and modeled for participants.

c. Participants have opportunities to model strategies and practice skills that allow for coach/trainer and peer feedback.

d. Ability to practice and sufficient support to adapt strategies to home contexts is built into agenda and facilitation planning for PD sessions.

Priority Strategy 3: Policy

AiiCE is producing resources to support policy changes and advocacy for those changes across K-16 computing education. The anticipated output is a set of vetted, educator-endorsed policy recommendations available for local and state adoption.

K-12 Policy IIC Tenets:

a. Definition and prioritization of CS as a “core subject”.

b. Adoption of and provision to schools with curriculum and instructional materials that are aligned with identity-inclusive topics and approaches.

c. Assurance during procurement process that hardware & software are accessible.

d. Removal of institutional and access barriers to CS courses and exams.

e. Provision of comprehensive educator preparation and professional development programs that support identity-inclusive pedagogy and practices.

f. Development of local, regional, and state CS education plans that center identity-inclusive computing practices.

g. Development of incentive structures to recruit, prepare, and retain a diverse pool of CS teachers.

Postsecondary Policy IIC Tenets:

a. Create or improve pathways to discovering, entering, participating in, and completing computing majors.

b. Institutionalize identity-inclusive computing across multiple courses within department curricula.

c. Expand the definition and balance of scholarly work that is valued in computing departments.

d. Recognize and address the oppressive nature (e.g., ableism, elitism, misogyny, and racism) of the hiring, promotion, and tenure processes.

e. Provide comprehensive, IICinformed professional development for faculty, staff, & TAs.

f. Regularly solicit & incorporate feedback on department climate from students, faculty, & staff of diverse identities.

g. Identify, implement, and promote a student-centered grievance process that addresses the inequities inherent in existing power structures.

KPIIC1. Definition and prioritization of CS as a "core subject."

Tech is omnipresent across educational, social, and workforce settings; and computational skills are necessary and applicable across subject areas therefore, CS is a requirement for a sufficient education. The study of CS as a core subject should be a foundational element of education, not aspirational.

Indicators:

a. Universal access to high quality computing courses across states and within districts.

b. Foundational, AP, and specialized computing courses are funded at appropriate levels, including the curriculum budget allotted to core subjects.

c. CS is a graduation requirement.

d. Students with disabilities are provided necessary supports for full participation.

e. CS is included in departmental meetings and budget discussions about departmental support.

f. Discipline-specific CS PD provided by school and district.

g. CS highlighted with other core subjects on back to school nights.

h. CS weighted similarly to core subjects in GPA.

i. CS counts toward college entry requirements.

KPIIC2. Adoption of and provision to schools with curriculum and instructional materials that are aligned with identity-inclusive topics and approaches.

Curricula and instructional material must enable students to critically analyze the role of identity and related topics (e.g., race, power, bias, discrimination, & oppression) as one component of developing CS competency in addition to the development of technical skills. See tenets for curriculum and pedagogy for more.

Indicators:

a. CS teacher-vetted identity-inclusive curricula and course progression are implemented.

b. IIC toolkit available to K12 CS teachers to assess current curricula used in K12 classrooms.

c. Compensated IIC professional development sessions for K12 CS teachers to understand IIC instructional practices in their classroom space.

d. Compensated lesson creation workshops for K12 CS teachers using their state standards.

KPIIC3. Assurance during procurement process that hardware & software are accessible.

Beyond simply providing assistive technology, accessibility must be a requirement in the procurement process for all hardware and software. Addressing the barriers faced by students with disabilities is necessary for their success and in upholding their right to an education.

Indicators:

a. Needs of students are assessed prior to the start of the academic year to ensure required assistive technologies are available for classrooms.

b. Accessible hardware and software are provided for courses (see this example of Maryland law adding an accessibility requirement in the procurement process for K-12 digital tools).

KPIIC4. Removal of institutional and access barriers to CS courses and exams.

K-12 institutions must work to reduce or eliminate institutional and systemic barriers for marginalized CS education learners so they can enter and persist in CS classrooms. See CSTA's CS Teacher Standards for Systemic Barriers.

Indicators:

a. Provision of accessible course materials and exams.

b. Student expenses for taking exams are fully or partially funded (e.g., travel costs to exam proctoring site, exam participation cost).

c. Sufficient number of qualified CS teachers available.

d. Prerequisites eliminated for participation in CS courses.

e. CS courses offered and accessible to all students.

f. CS courses scheduled to allow for maximum participation.

g. Eliminate prohibitive pathways and practices to student participation, for example by providing ELL or alternative services during computing courses.

h. CS courses, students, and teachers received adequate funding and resources, including provision of needed technology.

i. Students are not pulled from CS classes for additional services.

KPIIC5. Provision of comprehensive educator preparation and professional development programs that support identity-inclusive pedagogy and practices.

Functional policy requires provision of the human, organizational, structural, and material capacities (Century, J.R., 1999) necessary for high-quality CS educator prep, continuing professional development, and course development. Without attending to what is needed to make a policy effective, it is reduced to a slogan and unsupported mandate.

Indicators:

a. CS teaching certification required; includes teaching methods courses.

b. Root cause analysis, theory of change, logic model, need assessment, and implementation plan are developed for each of the capacity gaps obstructing comprehensive CS educator preparation and development.

1. Human Capacity: Knowledge, Skills, Behaviors
2. Organizational Capacity: Relationships, Communication, Partnerships
3. Structural Capacity: Policies, Processes, Practices
4. Material Capacity: Funding, Tools, Facilities

c. Implementation plan is funded at sufficient levels across capacity areas.

KPIIC6. Development of local, regional, and state CS education plans that center identity-inclusive computing practices.

Schools, districts, and states should establish plans and have staff to oversee the implementation of identity-inclusive CS instruction and learning.

Indicators:

a. School, district, and state implementation plans for identity-inclusive CS education are created with input from CS educators and community partners.

b. CS educators are recruited as paid reviewers to vet and approve the quality and feasibility of those plans.

c. Sufficient funding is provided for implementation of those plans.

d. State implementation plan and academic standards are established for CS.

e. State director and a supporting team is hired to oversee CS instruction and learning.

KPIIC7. Development of incentive structures to recruit, prepare, and retain a diverse pool of CS teachers.

To attract a new teacher pool, the profession they enter must be attractive (i.e., safe, supportive, and respectful of their professional and subject matter expertise; also, appropriately paid for those professional skills and expertise). Hostilities experienced by marginalized students in CS learning environments are also experienced by teachers from marginalized identities. Effective recruitment and retention policies are rooted in removing barriers for teachers and students. A generation of potential CS teachers and grow-your-own efforts are being sabotaged by unchecked discrimination among teacher colleagues and administrators.

Indicators:

a. Support appropriate pay across subject areas through collective bargaining.

b. Incentivize retention of teachers through higher salaries.

c. Deploy post-graduation survey to teacher prep program graduates to have them rate the training they received in relevance and effectiveness in preparing them to design identity-inclusive CS education and CS learning environments.

d. Guarantee beginning CS teachers instructional coaches for the first 5 years of teaching.

e. Provide CS teaching degree and certification paid for by state in return for service years.

f. Mandate IIC-informed teacher preparation courses.

g. Certify that teacher preparation faculty are trained and knowledgeable in IIC.

h. Require cultural competence training for current CS teachers and administrators.

i. Establish and enforce disciplinary and termination policies for discriminatory behavior from teachers and administrators.

PPIIC1. Create or improve pathways to discovering, entering, participating in, and completing computing majors.

Unnecessary gatekeeping of CS majors – via prerequisites, hostile classroom and department environments meant to "weed out" students, and exclusionary instructional strategies – betray universities' commitments to increasing diversity in CS.

Indicators:

a. Remove institutional and access barriers to introductory computing courses.

1. Eliminate entrance exams for computing majors.
2. Provide evidence-based instructional (e.g., active learning) and supplemental practices (e.g., tutoring) to students with skills gaps.

b. Provide clear transfer processes from community colleges into four-year colleges and universities.

1. Establish partnerships with community colleges to create a transfer pathway process.
2. Develop outreach and recruitment strategies specifically for community college students.
3. Eliminate financial barriers specific to students interested in transferring.
4. Support transfer students in fully integrating into academic and social life on campus.

c. Ensure equitable access to research, internship, and teaching assistant (TA) experiences for all students, including those who are undocumented.

1. Equip campus career centers to connect marginalized students with paid field and campus opportunities.
2. Provide stipends to attend academic conferences that do not rely upon a reimbursement system.
3. Create fellowships or stipends as an alternative payment method.

d. Establish viable computing+X interdisciplinary majors with the social sciences and humanities.

PPIIC2. Institutionalize identity-inclusive computing across multiple courses within department curricula.

To understand CS content knowledge and how that knowledge was produced, students must understand the social, political, and economic contexts in which computing developed. This information enables students to critically analyze the role of identity and related topics (e.g., race, power, bias, discrimination, and oppression) prior to the building of technological innovations.

Indicators:

a. Use instructional materials that are aligned with identity-inclusive topics and approaches.

b. Establish support services for faculty towards identity-inclusive syllabus development.

c. Provide identity-inclusive professional development to departments for faculty, teaching assistants, and staff.

PPIIC3. Expand the definition and balance of scholarly work that is valued in computing departments.

Support and give equal footing to faculty and students who draw upon CS research from diverse methodologies (e.g., qualitative and participatory) and fields (e.g., intersections of computing, social science, and the humanities).

Indicators:

a. Acknowledge the limitations of h-index scores (e.g., reflecting bias in who is and is not cited, disadvantaging newer scholars) to measure value, importance, or impact of research and lower the weight of those scores in hiring and promotion decisions.

b. Support researchers within computing who draw from diverse methodological perspectives, including qualitative and participatory research.

c. Support partnerships between social science and CS scholars.

d. Create research pathways for students interested in intersections between social sciences, the humanities, and CS.

PPIIC4. Recognize and address the oppressive nature (e.g., ableism, elitism, misogyny, and racism) of the hiring, promotion, and tenure processes.

Establish policies and practices that support non-tenure-track faculty, tenured faculty, staff, and teaching assistants for hiring, promotion, and tenure (if applicable) by eliminating existing biases that benefit only a privileged few.

Indicators:

a. Minimize the impact of student evaluations on hiring, promotion, and tenure decisions.

b. Expand recruitment efforts beyond a small subset of colleges and universities.

c. Create inclusive job descriptions.

d. Provide accommodations for faculty with disabilities that go beyond compliance, such as paid support staff.

PPIIC5. Provide comprehensive, IIC-informed professional development for faculty, staff, & TAs.

University CS departments' adoption of identity-inclusive computing (IIC) and related training for CS faculty, staff, and TAs will increase their individual cultural competence, provide competent instruction and historically literate presentation of computing concepts, and build inclusive – rather than exclusionary – department and classroom environments.

Indicators:

a. Mandate training for CS departments that utilize computing concepts and topics to explore IIC topics.

b. Provide ongoing professional learning communities to support implementation of IIC training and skill refinement over time.

c. Implement peer observations to measure IIC application and implementation and provide peer coaching and feedback.

PPIIC6. Regularly solicit & incorporate feedback on department climate from students, faculty, & staff of diverse identities.

To determine if inclusive CS efforts are working – and why or why not – information must be collected from those directly impacted: students. Because students from marginalized populations are targeted for poor behavior and harassment in CS environments, those same groups must be prioritized in naming, defining, and addressing the problems (with appropriate compensation for their labor).

Indicators:

a. Deploy CS department climate survey each semester.

b. Account for race, ethnicity, gender, sexuality, disability status, and class in climate survey design and data analysis plan.

c. Ensure that the analysis, publication, and discussion of climate data is co-led by students in a ratio equal to faculty.

d. Require annual public accounting of application and implementation of responsive action to identified issues.

PPIIC7. Identify, implement, and promote a student-centered grievance process that addresses the inequities inherent in existing power structures.

Current university grievance processes are often hostile to and traumatic for students because they prioritize the protection of faculty, staff, and administrators (for reputational and fundraising purposes). Protecting bigoted and oppressive CS staff cannot coexist with a stated commitment to diversify CS. Process design and implementation should be led by those most impacted by the system: marginalized students and faculty (appropriately compensated for the time and labor and awarded in tenure decisions).

Indicators:

a. Co-create with students an equitable grievance process.

b. Establish an oversight board comprised of students and faculty from groups most often targeted (based on review of climate survey data and an analysis of initiated complaints).

Collaboration & Partnership

AiiCE's theory is that previous efforts to diversify CS have not yielded substantial or sustained results because they focused on just one lever – people, practice, *or* policy. By focusing on people and practices while securing funding and protection for those people and practices via policy work, this collective hopes to make a meaningful impact on CS. Often, that one lever has been student-focused, suggesting a deficit in students that could be addressed by giving them tools and resources rather than transforming the institutions - via people, policy, *and* practices - undermining them.

A fourth lever will help the group test this theory and monitor results: a research collaborative. Researchers and practitioners across K-12 and postsecondary education systems will co-develop resources to examine the impact identity-inclusive computing education is having on, for example, course enrollment and completion; student/faculty perceptions of race in computing; degree entry, retention, and completion; and classroom cultures and department climate. AiiCE will also deploy an annual national survey of K-12 CS teachers to understand teacher contexts, needs, and abilities regarding cultural competence and knowledge
and use of identity-inclusive strategies.

Join the AiiCE network if you are interested in increasing your individual cultural competence; creating CS course environments that are reaffirming – rather than obstructive– to the CS identity formation of students from historically excluded populations; and deploying inclusive -- rather than exclusionary – teaching strategies and instruction that improve learning for all students.

"Equity is fairness and justice achieved through systematically assessing disparities in opportunities, outcomes, and representation and redressing [those] disparities through targeted actions."

— Urban Strategies Council

TAKE TARGETED ACTION.

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