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## **Working Towards More Equitable Team Dynamics: Mapping Student Assets to Minimize Stereotyping and Task Assignment Bias**

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## **Working Towards More Equitable Team Dynamics: Mapping Student Assets to Minimize Stereotyping and Task Assignment Bias**

Elisabeth (Lisa) Stoddard and Geoff Pfeifer

### ***Stereotyping and Bias on Student Teams***

Group-based learning in Science, Technology, Engineering, and Math (STEM) programs and institutions is common because it prepares students for STEM careers that require regular work in teams, and it allows them to develop skills associated with collaborative problem solving. These skills include communication, leadership, management, creativity, problem solving, and conflict resolution. However, research shows that stereotyping and bias are problematic on student teams, particularly in STEM, and these biases hamper the effectiveness of teamwork in Project Based Learning and student learning as a result. (Meadows et al, 2015; Wolfe et al, 2016).

Women and students of color are underrepresented in STEM educational programs and in the STEM workplace (National Science Foundation, 2017). Lack of representation of female and people of color in the STEM student population and faculty perpetuate the dominant perception of STEM fields being white and male, where the values, cultures, and norms of the majority become the default against which everyone is measured. As women and students of color enter this culture, they are faced with stereotypes and biases about their intelligence, competence, and ability to perform (Meadows et al, 2015).

Women and students of color can be stereotyped as less intelligent, less competent, or as underperformers (Meadows et al, 2015; Wolfe et al, 2016). It is often assumed that these students have not been accepted to a STEM program based on merit, but based on policies that favor historically underrepresented students (Meadows et al, 2015). In a published writing piece, a student at Worcester Polytechnic Institute explains:

When the other girl gets accepted to RPI and WPI and Cal Tech and MIT, and the acceptance letters pile up....I watch the boys whisper in her ear: ‘They’re just meeting

their quota.’ ‘Anybody else smell affirmative action?’ ‘Looks like they got their headcount.’ ‘Here comes the Quota Queen!’(Locke, 2017).

These stereotypes and biases can materialize in a number of ways that shape team dynamics, student learning and experience, and team productivity. For example, Meadows et al. (2015) found that these assumptions that women and students of color are not up to the task shape what tasks they are assigned on teams, whether or not their ideas are heard or validated, whether or not their work is acknowledged, as well as their self-efficacy and feelings of belonging.

Since the fall of 2016, the authors have been engaged in a research project investigating the presence of bias and stereotyping on first year project teams at our institution. We have also analyzed the impacts bias and stereotyping on student learning, student experience and sense of belonging, as well as on team productivity. Our findings, consistent with Meadows et al. (2015) and Wolfe et al. (2016), showed that women and students of color experience higher rates of having their ideas ignored or shut down, having their voices silenced, being assigned work tasks deemed less valuable, having to deal with a domineering teammate, and having their work go unacknowledged or credit stolen by another teammate (Pfeifer and Stoddard, 2018).

In the quote below, a white female student at our institution reflects on what Meadows et al (2015) have identified as, ‘task assignment bias’, when students assign themselves or others tasks based on unconscious biases about who is most capable or best suited for different tasks. She also experiences ‘intellectual marginalization’, when a student’s ideas are ignored or not taken seriously (Meadows et al, 2015). “I’ve noticed instances where my group seemed to assume that I was not as capable of doing the work simply because I was a girl. I was given smaller tasks, and my opinion was not valued as highly as the guys I was working with”. Experiencing task assignment and other biases can result in affected students losing the opportunity to learn areas of content and particular skills, a loss of confidence, and can lead these students to avoid the group work experiences and skills they need to prepare them for the STEM workplace (Meadows et al, 2015).

In another quote, a female student of color at our institution discusses her experience with task assignment bias, as well as needing to put more work into the project than her other teammates in order to prove herself and to overcome stereotypes, which is a common problem for women and students of color in STEM (Meadows et al, 2015):

I can't help but notice at first Jack<sup>1</sup> got the more dominant role that requires a lot of extensive research and seemed to out do both me and Amber in the tasks we had to do....The work we divide tends to have the same degree of work, but it still seems as if I always lag behind them. Or in order to do something as meaningful, I have to do twice the amount of work as them.

Having to work against these stereotypes is time consuming. It is also challenging to balance this with the typical workload students and professionals have and it leads women and students of color to leave STEM for other fields (Meadows et al., 2015; Williams et al., 2014).

### ***Managing Team Dynamics: Models for Equality vs. Equity***

The ways that faculty in our program and at our institution have typically dealt with team issues, such as contending with a domineering or “slacker” teammate, is to help students put procedures in place to avoid them. These procedures have included having teams write up team contracts and make use of task schedules and other mechanisms to ensure that all team members participate equally in the various parts of the project (for an example of such things see Wolfe, 2010). The problem with these types of interventions is that while they can help with a kind of nominal equality amongst team members in the sense that they can put structures in place to ensure that each student on the team contributes, they do not take into account some of the issues discussed above around race and gender based bias. For example, a task schedule which distributes work equally among all team members, may still fall prey to task assignment bias, wherein a gendered division of labor is instituted such that men on the team are assigned technical tasks while women on the team are assigned organizational and other non-technical tasks as a result of gender based biases that view men as better able to complete technical work.

Equality-based structures also do not account for other types of oppressive norms such as those based on race. For instance, a team contract which outlines norms for discussion of issues and

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<sup>1</sup> All student names have been changed to protect student identity, in accordance with our IRB approval.

ideas on the team by ensuring that every individual on the team is allowed to speak, does nothing to combat bias in relation to whose ideas are taken more seriously and whose ideas are not. Research shows that there is implicit bias on teams in relation to this wherein ideas expressed by white male students are often given more priority than those expressed by students of color or women. Meadows et al (2015) identify a variety of ways this can happen. For example, the ideas shared by women and students of color are often not written down during team brainstorming sessions, and the ideas of women and students of color are often not considered until or unless validated by a member with a more dominant identity. Therefore, a contract which ensures that everyone gets an opportunity to speak at meetings does nothing to ensure that ideas are equally valued and considered. It is for these reasons that we have moved to an equity-based intervention structure and away from the classic equality based models.

In order to accomplish this, we built upon existing equality-based models of team support tools (such as those in Wolfe, 2010) in order to develop equity-based team procedures and tools that account for bias and stereotyping and that work to overcome or minimize them (for full list of tools see Author 2 and Author 1, 2018). Asset mapping is one tool that we have found to be particularly effective in creating more equitable team dynamics. Asset mapping involves taking an inventory of an individual's and/or group's strengths and resources.

### ***Asset Mapping as a Tool for More Equitable Team Dynamics***

Asset mapping was developed by Kretzman and McNight (1993), scholars in community development. It was proposed as an alternative to a deficit mapping approach, which focuses on a community's problems. Deficit models have been criticized for promoting a model that creates a reliance on outside resources and experts instead of developing communities themselves to draw and build upon their own strengths. Deficit models in education (looking at student weaknesses or vulnerabilities) have faced a similar critique, as they look for outsiders and experts to fix a student's "problems", instead of drawing and building on students strengths to enable them to be successful in the educational setting they are operating in (Edwards, Mumford, Shillingford, and Serra-Roldan, 2007). Deficit models in research, and in teaching students research methods, have also been critiqued for not considering gendered, raced, and classed experiences as sources of strength (Smith-Maddox and Solórzano, 2002). Asset models look

inward at the strengths of individuals and of communities, in both the areas in which they experience privilege, as well as in the places where they can experience marginalization.

To create the context for more equitable team dynamics, we have our students identify their own assets, share them with their team members, and create team asset charts, which are used by the team to determine who will take on which task or who will lead on which part of an assignment (e.g. research, writing, presentation, interviews, modeling, calculations, etc.). The goal, in part, is to create tools and procedures that minimize task assignment bias by having teams assign tasks and goals based on individual team member’s assets and/or areas in which that team member wants to build upon or grow. See a sample student asset map and a sample team asset chart below. In the sections that follow, we discuss both the benefits and limitations of asset mapping for minimizing task assignment bias and for creating more equitable team dynamics.

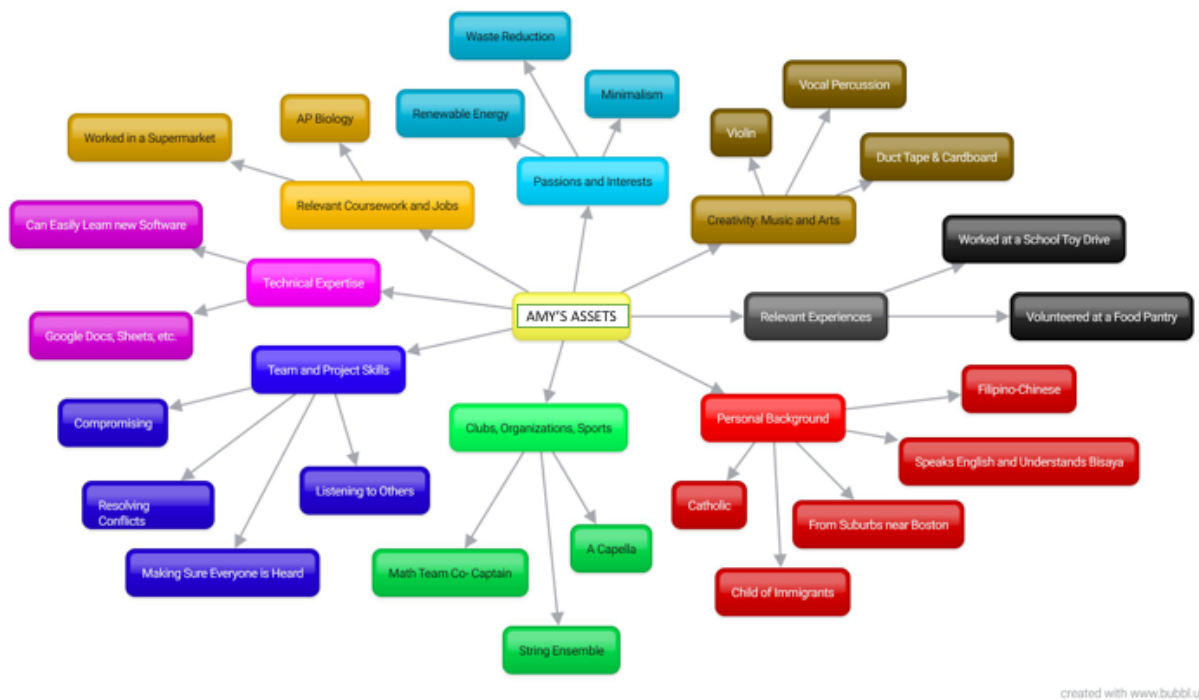


Figure 1: Sample Student Asset Map

Team Asset Chart		
Skill and Content Areas in B Term	Team Member’s	Relevant Assets

	<b>Names</b>	
Conducting interviews with experts	Olivia	Conducted interviews while working at National Library of Health
Developing a research design that will be transferable to the Interactive Qualifying Project and other research opportunities	Sara ----- Tushar Sam Olivia	Research opportunity at Walter Reed Army Institute of Research ----- All have had preparation from previous GPS course (A term)
Data analysis, using qualitative coding and other analysis tools	Tushar ----  Olivia	Has experience with basic statistics and programing ----  Experience managing databases and extrapolating relevant information that can explain a relevant issue.
Evidence-based writing	Sara Sam Olivia Tushar	All have experience writing lab reports and qualitative data analysis for multiple subjects
High level team functioning (delegating and rotating tasks and roles, using and building on each other's assets, managing conflict, etc.)	Sara ---- Sam	Lots of experience with group projects and can see both sides to an argument ----  has experience working on various teams from the Massachusetts Congressional Youth Council Experience working as a Youth President and team
High-level, creative oral presentations	Olivia	Has experience presenting to large audiences and creating interactive presentations.

High level, creative visual presentation	Sam Tushar	Both have taken digital photography and graphic design courses
Communication skills – relaying your research to experts and to the public	Tushar	High school project involving several months of research and culminated in public presentation
Cultural context: understanding your project in the cultural context in which it is situated, and how you can learn from the communities' expertise to develop a powerful solution.	Sara Olivia Sam	All have done community service in less developed countries

Figure 2: Sample Team Asset Chart

### ***The Benefits of Asset Mapping for Team Equity***

Using individual asset maps and team assets charts have four major benefits for creating more equitable team dynamics: 1) it builds student confidence, including for those students who have experienced bias and stereotyping; 2) it allows students to get to know one another personally, which helps to overcome stereotypes; 3) it provides students with a procedure to divide tasks based on skill and interest, minimizing task assignment bias; and 4) by documenting one others' assets, and linking them to work tasks, it provides students with a document to analyze, articulate, measure, and discuss (in)equity in their team dynamics.

### Mapping Assets Builds Student Confidence

First, identifying one's own assets can build student confidence, particularly for students who are or have been stereotyped as less capable (Maton and Hrabowski III, 2004). A Native American and first generation college student explains:

....the asset map shows me what I'm capable of....I plan on editing my asset map again because I'm going to need it to remind myself what I'm good at. Until I work on enough projects, assets never stop, I feel that my asset map should pages long by the time I'm 40. I will continue to utilize my asset map to help me in the future.



In another example of asset mapping building student confidence, a white female student writes about how the assets she brings to her team will help to compensate for some of the areas she where she perceives that she has weaknesses:

Through creating my asset map, I surprised myself with what I may be able to offer in a team project, specifically in [this course, focused on challenges of developing] ‘livable cities’...I often feel intimidated by the intelligence of the people around me, as I believe I may not have as much to offer with experience or general knowledge. I may not be the smartest, and I’m not a great writer, but what I lack in these areas I may make up for in creativity, and I have many interests that directly correspond with this course. I’m an artist, I’m great with visuals and with thinking outside the box, and I’ve always been interested in architecture and the way it influences efficiency in cities. I am also very environmentally conscious, and have become very interested in sustainability and green solutions to urban problems. I have a passion for animals, and like to volunteer at local humane societies. I have some technical experience using CAD and Revit drawing programs from an Civil Engineering and Architecture course I took in high school. This summer, I experienced living in cities in Italy, Spain and Ireland while traveling Europe, and this gave me a better understanding of different cities and overall different cultures, while also making me more aware of the problems cities face.

Whereas some of those things this student self-identifies as shortcomings clearly correlate with stereotypical beliefs about the gendered differences in aptitude and ability discussed at the outset of this paper, we see here how the asset map helps this student counter these with other skills and experiences that she can bring to the project team.

### Mapping Assets Can Build Team Member Relationships to Overcome Stereotypes

When students share their asset maps among their teammates, they all get to know each other through telling stories, accomplishments, experiences about their previous school work, jobs, clubs, sports, family life, church, volunteer work, and more. As students get to know each other personally, they are less likely to rely upon stereotypes to determine who is capable of what type of work (Meadows et al. 2015). Kyle, a white male student explains:

Initially, I think stereotyping had some effect on what we all initially thought of each other.... Initially I saw James as a ‘nerdy’ kid, and Miles being completely introverted,

but these were extremely unfair biases as they are not the case. I also think that everyone on the team saw me as a ‘jock’ type of personality that only came to college to party, even though that is definitely not the true. The group was able to move past these unspoken stereotypes we put on each other to work together successfully. [Working on this team] is different because everyone has a very unique skill set, and they each approach the problem at hand differently. I believe this has allowed me to learn an enormous amount about myself. I now better understand the parts of myself I have to work on when placed in a team so that it functions the most successfully. It has also given me new experience on how everyone else approaches work.

By sharing assets, students get to know their teammates and understand the unique skill sets, perspectives, and experiences each member has to offer the team and project. This not only helps to overcome stereotypes about ‘jocks’, ‘nerds’, women, and others; it also allows members to see value in approaches and experiences different from their own.

#### Mapping Assets Can Minimize Task Assignment Bias

Creating a team asset chart, and requiring its use for dividing tasks, provides students and teams with a procedure that enables them to divide work based on skill, interest, and experience, instead of on unconscious biases regarding who is more or less capable. Sandi, a white female student, explains:

My experience on this team is significantly better than my experiences on other teams...Everyone’s voice is heard and addressed, which I believe comes partly from the fact that our tasks are generally distributed based on each person’s individual skillsets. Emily often takes on a lot of the more communicative tasks, like emailing professionals and conducting interviews, while Amir and I often take on a lot of the more technical tasks like computer work or analyzing data. This system allows us to keep all of our tasks in check while also ensuring that each team member has something valuable to be doing at any given time, thus allowing us to hear each other out and take each other seriously.

Teams can also use their asset chart to assign tasks based on member’s desires to grow or develop in certain areas, with the support of their teammates. A white female student explains:

We try to use our different strengths to an advantage and build on our weaknesses as well. One example is during the interviews. We knew Josh was the best person for the job, but we all got to lead at least one of the interviews so we could gain experience. I also have a lot of experience in technical writing as I wrote up a 70 plus page portfolio for my engineering project last year. Therefore, I will be leading this aspect of the project. However, there will also be times where Josh and Rita get to lead in this area as well. We all want to make sure that our strengths are used appropriately and that we also get experience in other areas that we might not have had before.

The asset chart, in this case, provides the opportunity for this student team to both recognize individual strengths and make use of them, but also to develop skills of all team members in an equitable way so that everyone is given the chance to build experiences in areas that they may be lacking.

#### Mapping Assets Provides a Tool for Students to Evaluate (In)Equity

Documenting each others' assets and linking them to work tasks provides students with a document to analyze, articulate, measure, and document inequity in their team dynamics. For example, after learning about issues of stereotyping and bias on student teams in STEM and reviewing her team's asset chart, a female student of color writes:

Because of the stereotype that women are better suited for secretarial type roles that are considered more feminine, they are often assigned roles that focus on organization. Reflecting on my own experience, I realized this was very accurate for my own group. While John and Arjun focused heavily on finding new technologies, Katie and I conducted other research that was still important, but not so focused on specific technologies. I also was assigned the role of email coordinator and conducting the interviews....I was not aware of how this stereotype was affecting our group nor did I think it was a problem. Some strategies that my team could use to make the team dynamic more effective is switching up the types of roles we do everyone now and then. That way, Katie and I get more experience with the technologies and John and Arjun get more experience with organizing. Also, I think it would be beneficial for each of us to reflect on the own biases we each have and think about how that is affecting the group

Here we see how the team is able to collectively recognize how they are inadvertently participating in and reproducing a problematic division of labor and are then also given the space and tools to correct this in a concrete way.

### ***The Limitations of Asset Mapping for Improving Team Equity***

One of the main issues that we have found with our approach is that bias and stereotyping shape our asset maps. Gender and race-based stereotypes, like other forces that influence and shape individual identity, exist prior to the experience of individuals. As such, they form the background against which individuals experience their world and also come to ground self-concept and individual self-understanding (Butler, 1997; Baron et al. 2014). Our research is littered with the material products of stereotype-driven student self-reports of assets. More men than women for instance, see themselves as leaders (and have experiences that have helped develop their leadership skills). Men also more frequently detail their experience and skill with technical tasks, while more female-identifying students report having developed strong organizational skills and also being good at managing conflict. This is in part because gender-based stereotyping has material effects such that different skills are encouraged, identified, and enacted in different individuals as result of these socially and historically gendered notions about differences in ability in relation to different skills (Butler, 1997).

This is not only true of gendered stereotypes, but also of stereotypes based on race and the experiences that result from these. For example, in writing about previous group experience, a female student of color explains:

In my experience working in groups, it makes me feel as if I shouldn't speak or contribute anything to the group because I have nothing worthy to bring to the discussion table, which is not true at all. I realized that this had been going on for a long time through my primary and part of my secondary school life that when it got to be times I had to lead my group into finding a solution I was faced with anxiety.

This kind of experience and internalized oppressive structure is very difficult to overcome. It is also hard to get students with more dominant and privileged identities/positions to recognize these reports as being the result of oppressive social norms and stereotypes.

More privileged students often explain away team inequity when other members of the team see it as bias. For example, a white male student reflecting on why a female student of color may be speaking the least and not having her ideas considered by the group says, “In general, I do not think bias shapes our team dynamics.... One thing that may be happening is that Akila get less attention and talks less because she is [physically] small....” It is hard to get students, such as the one here, who are not accustomed to having to think about bias, and/or have little experience being marginalized, to recognize when marginalization is at play in interactions. Students who do not have identities that are regularly subject to such marginalization find it difficult to see themselves and their social positions as unwittingly participating in the reproduction of of such dynamics.

Even though this is the case for some students, we recognize also that being able to come to grips with and overcoming socially ingrained and solidified racial and gender stereotypes is not something that happens over-night or through one encounter such as that provided by work in our classes around team equity. As the research shows, this is a much slower and difficult process (DiAngelo, 2011; Cech, 2014). So we see this work as a first step in this longer process. Our recommendation is that these kinds of activities and exercises happen at multiple points throughout a student’s time at the university as repeated exposure can have the effect of making privileged students more comfortable thinking about issues of race and gender stereotyping and the ways in which their social positions and unconscious biases might be operating in team dynamics (DiAngelo, 2011). Recognizing the value of the work we have done on a smaller scale and also the above, our university has, for instance, taken steps to begin to integrate this work at a programmatic level across the curriculum so that students have regular and repeated exposure to it. We have also, however, seen instances where this work does help privileged students become more aware of these processes and become able to recognize when they are happening. Such students then work to further understand and counteract the effects of stereotyping and bias, as one of our students writes: “As a white-passing male, I now feel obligated to learn more about the systems and institutions that marginalize others around me and what I can do to help.”

One other limitation we have encountered for some students surrounds social norms and expectations around self-promotion. For example, Moss□Racusin and Rudman (2010) explain

that self-promotion is “a behavior that violates female gender stereotypes yet is necessary for professional success”. As such, some of our female students found sharing their assets and promoting their strengths, skills, and experiences as reasons why they should take on particular teams tasks to be difficult. International students coming from cultures when self-promotion is discouraged can also find asset mapping exercises to be uncomfortable and challenging (Clark and Molinsky, 2014). One female international student explains, “The next step was sharing our assets. At first this task seemed to be a little awkward as normally, at least in my experience, bragging about oneself is looked down upon. But to fully understand each of our own potentials within the group it was necessary.” As you can see in the quote, however, the student ultimately recognizes the benefits of going through this work, even if it was difficult to push against these social norms and expectations.

### ***Tips for integrating Asset Mapping into your Classroom***

We have found that asking students to map their individual assets within the first few weeks of class (and prior to any team based activities) works well as it can set the stage for further use of these asset maps in a variety of ways. As our research demonstrates also we think that pairing the asset maps with some reflection on them, in the context of both teamwork and problem solving, is useful in getting students to see why they are making the maps. We have students read one or two articles about diversity and teamwork (such as Hill, 2014 and/or Mendin et. al. 2014) and also about bias and stereotyping on teams (here we like to use Meadows et. al. 2015 and Wolfe et. al. 2016) when we introduce the asset maps as a way to get students thinking about the role identity plays in team based work. We also ask them to reflect on the ways that the skills they identify in their maps could be beneficial in the work for the class (both in relation to teamwork and in relation to course content and assignments). We also recommend having students complete the team based asset charts right at the beginning of any team based assignments and then have them periodically check back over these to be sure both that they are making use of the identified assets and also so that they can assess growth in areas that individual team members desired more experience with. These are just some of the ways that we employ asset mapping in our classes (For a more complete breakdown of how we make use of these, see Pfeifer and Stoddard, 2018).

## ***Conclusion***

We have found asset mapping to be an effective tool in helping students work through some of the problematic effects of race and gender-based stereotypes and biases as they operate in student teams. It addresses and minimizes stereotyping and bias on student teams broadly, but it also does so in a way that offers the potential for deeper understanding of the ways bias and stereotyping affect individual students and the team as a whole. Using asset maps helps marginalized students see beyond limitations that they may have internalized, as a result of being subject to stereotyping and bias, thereby building confidence for these students. Team asset charts can help all students on a team see who has what skills, and who wants to build skills that they may be lacking. This also can challenge implicit biases that might structure team interactions and distribution of workload. The chart offers a concrete and fairly extensive listing of skills all students on the team possess. Without the chart, these skills could go unrecognized precisely because of bias and stereotyping, including those that are internalized.

The use of asset maps and charts can help overcome the limitations that we describe above. This is especially helpful in relation to the ways that gender and race-based biases and stereotypes structure the experiences of those students who are subjected to them in ways that develop some skills but not others. This is because, as we have seen throughout the paper, such mapping and sharing has the effect of making such biases visible to all students. It also creates the conditions to go beyond mere equal divisions of work to equitable divisions of work, such that students who have been excluded from certain types of roles on teams (e.g. technical or leadership) are able to gain experience in those roles. As such, new assets in these areas are developed, which can then be employed and further developed in future work. This offers the possibility of a real material overcoming of the effects of bias and stereotyping, and can begin to challenge and short-circuit their reproduction.

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