Presidential Address: Collaboration and Diversity in STEM

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Introduction

Sheryl Sandberg, the COO of Facebook, published a book titled 'Lean In', where she invites women to sit at the table. In summary, to 'sit at the table' entails not only embracing opportunity, but to actively seek out opportunities in leadership positions. Sandberg points out that, unfortunately, apart from institutional obstacles, a woman's own perceived limitations have a negative impact on her leadership ambitions. To create an environment where diversity will flourish, where everyone has a seat at the table and everyone has a voice, safety must be established first. To establish safety within a diverse team, there is power in relationships and connections.

This study will first and foremost review theories in literature as to why diversity and inclusion are so important and the value that diversity brings to our industry. The study also recommends a few focus areas for improving diversity and inclusion in the industry.

The case study will cover:

- My own personal diversity journey
- A summary of national and international diversity targets and totals
- Neuroscience and diversity
- How to get involved in diversity and inclusion.

A Personal journey

My leadership journey started in a specialist position, in a department that valued specialist opinions. Since the environment was so highly specialized, individuals were self-motivated, striving for perfection was ever present, and the preferred leadership style was pacesetting. My exposure to leadership was among highly academic, widely published, world-renowned scientists. After working in that environment for 8 years, my idea of leadership was that perfectionism is an attainable goal, that it shields me from judgement, that it is a quest for excellence and continuous improvement, and is the key to success. Being the expert and having specialist knowledge in a particular field 'saved' me in hard situations and became part of my value system at work. It was only 7 years later that I realized I was placing all my power in the knowledge I had. This realization dawned when I was confronted with making a choice between staying in a specialized position or moving into general management. I chose to challenge myself, my value system, and my basis of power.

Power in relationships

Literature gave me the language I needed to understand why I found the transition from power in knowledge to power in relationships challenging. I first had to understand what all the available sources of power were. The University of Colorado, together with the Center for Creative Leadership (Bal, 2008), published a summary of the main bases of power.

1. The power of position, which is the formal authority derived from a title or position.
2. The power of charisma, which is based on the influence that is generated by a leader's style or persona.
3. The power of relationships, which is gained through networking, both inside and outside the organization.
4. The power of information, which is control generated using evidence deployed to make an argument.
5. The power of expertise (or knowledge), which is the influence that comes from developing and communicating specialized knowledge.
6. The power of punishment, which is basically the ability to sanction individuals for failure.
7. The power of reward, which is basically the ability to reward for adhering.

My power was developed in expertise and knowledge, which suited a highly specialized environment, but moving into general management, where I had to be the leader of a team for the first time in my career, I didn't have enough knowledge to be an expert in every discipline. Not moving my basis of power in knowledge led to distrust, poor decisions, and unnecessary, unproductive conflict. It also led to self-judgement.

When I spent time with literature on this topic, I realized that in my leadership position and in the current business economy, more power is found in relationships and connections. There is a vast amount of literature available which discusses, in detail, the power of connections in an organizational structure; however, I will present the key concepts that helped me make the shift from power in only knowledge to power in relationships also.

Abraham Zaleznik, professor of the psychodynamics of leadership at Harvard Business School, categorically stated in 1970 that leadership elements comprise inspiration, vision, and human passion. He believed that no organization could flourish without establishing the power in the relationship of a central figure with his group. He also believed that failure to establish relationships within an organizational structure will result in the inability to make decisions, to evaluate performance, as well as in-fighting. This was exactly what I was experiencing while attempting to establish a new department, in a new culture, with a new team that comprised various disciplines that I had no specialized knowledge of (including civils, electrical, and mechanical).

Professor Zaleznik stated that when relationships or connections fail to develop, the first problem to address is the leader's inability to create confident relationships. He also believed that this inability usually hinges on the nature of the leader's defenses (Zaleznik, 1970). At the start of my own leadership journey my defenses and armour were crippling my attempt to protect myself from my own lack of knowledge. I did not yet understand that my team's success did not rely on my expert knowledge of each individual discipline, but rather on my ability to form connections and to create an environment where diversity, knowledge sharing, and innovation are permitted to flourish.

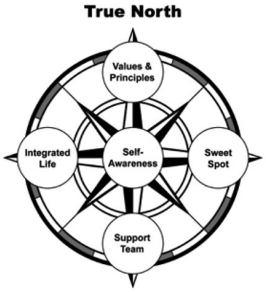
In different research fields, results show that human connections play a central role in fostering a sense of purpose and wellbeing in the workplace. These studies made me question the link between healthy relationships (or connections) and the core values of a high-performing team. If a high-performing team has the core values of trust, free expression, engagement in constructive criticism, and engagement in extensive discussion (Wiese and Ricci, 2012), it would be easier to maintain, uphold, and support these values if there were meaningful connections in the workplace. If meaningful connections create the safe space for expression, engagement, and sharing of ideas, this supports the theory of Dr Rob Cross, Professor of Global Leadership at Babson College, that meaningful connections and relationships facilitate learning and knowledge sharing across boundaries. Moreover, Dr Cross believes it increases employee engagement, reduces burnout, sparks innovation, and improves performance. I wanted to create a space where I could re-programme my fear of criticism, could nurture engagement, and where we could reach optimal performance as a team. Therefore, the need for power in relationships became more and more evident.

We need to appreciate the power which lies within relationships and connections and then create an environment that promotes power in relationships to harness collaborative competition and constructive conflict. However, I had no idea how to establish this environment, nor how to develop connections within a brand-new position, with a brand-new team, within a brand-new culture. More importantly, I had no idea how to do this as the only and youngest, technical female leader, without losing my authentic self in the process. Therefore, I had no idea how to make the shift to power in relationships, by utilizing my own unique attributes as a female leader.

Authentic leadership

At the time, our project manager started a *'Leadership Journey'* for his senior management team. One of the themes of this Leadership Journey was Authentic Leadership, and I was introduced to the work of Bill George. From this work I realized that to stay authentic, while developing as a leader; I had to know myself, my values, what my leadership principles are. and what motivates me. These key knowledge areas are shown in Figure 1.

In addition to the realization that an authentic leader first cultivates self-awareness and then understands his own deeply held values, I also read Brene Brown's works, which clearly state that values guide us during difficult situations. More specifically, she defines integrity as choosing courage over comfort and allowing our values to guide our actions. Dr Etienne van der Walt, neurologist and founder of AmazingBrainz and Neurozone, defines integrity as practicing your values in difficult situations. According to Brene Brown's research, less than 10% of organizations have operationalized their values into behaviours. Simply put, Brene Brown states that 'no values = no me'. It means that you will never be able to set boundaries, lean into difficult conversations, nor will you be able to talk to people (instead of around them) or take care of them.



Leadership Element	Key Challenge
Self-Awareness	How can I increase my self-awareness through introspection and feedback?
Values	What are my most deeply held values? What principles guide my leadership?
Sweet Spot	How can I find my sweet spot that integrates my motivations and greatest capabilities?
Support Team	Whom can I count on to guide and support me along the way?
Integrated Life	How can I integrate all aspects of my life and find fulfillment?

Figure 1—Key knowledge areas in authentic leadership (from Bill George, *True North*)

What I realized from my research on authenticity is that none of these principles rely on gender, race, nor any other form of human diversity. Self-awareness, determining the core team's values, creating our brand and establishing the way we work became common ground for me and my team and did not rely on gender at all. This was a human connector. It only required collaboration, which quite incidentally is one of the female leader's unique capabilities, as confirmed by Dr Etienne van der Walt in his *Neurozone* work.

Staying authentic, but in balance

Sheryl Sandberg, COO of Facebook, states very clearly that '... we do not embrace female leadership'. In an interview with the COO she said: 'We call little girls '"bossy'. We do not call little boys '"bossy'. We tell those same women they are too aggressive in the workplace. We rarely say that to men, even though we know with gender blind studies that men, on average, are more aggressive in the workplace.'

The COO captured the female leader's dilemma and challenge brilliantly when she summarized that woman are associated with caring traits because they have been overrepresented in such roles, while men are associated with agentic (leader-like) traits because they have been overrepresented in roles requiring agency. Furthermore, both genders are exposed to bias: if a female in a leadership position enacts masculine behaviours she will be penalized for a lack of femininity (and be disliked). But if she behaves in feminine ways, she will not be seen as leader-like. Men who lean into their home, especially caring for young children, can have their masculinity questioned. Dr Brown confirms this in her book Daring Greatly (Brown, 2012). Although both women and men are exposed to shame triggers when being authentic, Dr Brown describes the shame triggers for women as a metaphorical web. Mahalik *et al.* (2005) published a study on development of the conformity to feminine norms, where they found the most important attributes to being female are being nice, pursuing the ideal body, being modest, and being domestic. Laura Liswood, from the Council of Women World Leaders stated in a 2019 interview with Forbes Women (Michelson, J. 2019), that when a man says 'I don't know' he is perceived as an authentic leader. When a woman says, 'I don't know' it's perceived as weakness and incompetence. Therefore, in my own opinion and experience, in a male-dominated environment, female leaders are faced with the following obstacles when trying to be authentic in difficult situations or conversations:

- Don't upset anyone, but speak your mind
- Be authentic, but not if you're shy or unsure about the subject at hand
- Don't cause an uncomfortable situation, but always be honest
- Don't get emotional, but don't appear to be detached
- React, but don't show it, otherwise you overreact
- Always remain modest, calm, collected, composed, dignified, and poised, otherwise you are seen as irrational and emotional
- Don't be a knower, but also don't say that you don't know.

To be my authentic, passionate, loud self in a difficult situation almost always seemed detrimental. I needed assistance in having courageous conversations, having constructive conflict, and also in developing a strong back but soft front. I found inspiration in literature; there are extremely good examples, in the global market today, of female leaders who lead authentically. These examples include Laura Liswood, Council of Women World Leaders and Helena Morrissey, chief executive of Newton Investment Management (and author of *A Good Time to Be a Girl*), as well as Christine Lagarde, head of the IMF.

Liswood states that 'There is some sense that women lead differently than men, but it's hard to parse out if it's because of gender differences or because women have historically been in the non-dominant group and men have been in the dominant group.' Liswood believes that a non-dominant group will always know more about a dominant group; therefore, she believes that when women step into leadership, they are forced to work, network, and produce results in a system designed for men, by men. Nonetheless, she has still found that women form deeper connections, collaborate differently, find more creative solutions (born out of necessity), focus more on various stakeholders, and tend to be better prepared.

Morrissey established the 30% Club, which campaigns to increase the number of women on company boards. This started in the UK in 2010 after a major financial crisis (which basically means the bank had a funding crisis because due to the credit crunch it could not secure the short-term funds it needed). The 30% club has since spread to 14 different countries and regions. Despite the need for something new during this financial crisis and although Morrissey pointed out 'there is no business case for just one type of person running things', she struggled to find support, with most chairmen seeing diversity as a women's issue, not a business issue. That started to change as diversity came to be seen as part of a solution and the 12.5% of women on boards increased to 30%.

In 2019, at the Forbes Women's Summit in New York City, Christine Lagarde, the first female managing director of the International Monetary Fund, stated that there were only six countries in the world (at that time) where there was no legal gender discrimination. According to IMF research, adding one more woman to a company's management or board is associated with a boost in return on assets of up to 13%. Another IMF report concluded that banks are more stable when they have more women on their boards.

What all these exemplary female leaders have in common is the message that it is advantageous to have a diverse workforce and to have female leaders, as well as male leaders, in management positions. It is important to note that bias can affect men as well. In a typically male field, people rated their male colleagues as less masculine and less deserving of workplace success if they had female supervisors (Brescoll *et al.*, 2012). Therefore, diversity is a balance, a bridge, and a collaboration. Barbara Annis, CEO of Gender Intelligence Group (GIG), an expert on gender, diversity, and inclusive leadership, advocates the value of gender unity – not equality, but unity. How this balance is established is shown in Table I (Annis, 2016).

I can be authentic and believe that I will bring balance to a male-dominated world. I can control how I engage in difficult conversations and situations. What I cannot do is control others' perspectives and biases. What I can do is create an environment to accommodate more collaborative personalities. In this way I can achieve optimal advantage of diversity.

Neuroscience and diversity

The neuroscience work referenced in this study is the work of Dr Etienne van der Walt, from Neurzone and Karien van der Merwe, a registered industrial psychologist, from the Thrive Institute.

Table I

Female *vs* Male Leaders

Female Leaders	Male Leaders
Interactive	Transactional
Participative	Hierarchal
Collaborate connectively	Collaborate competitively
Group problem solve	Personally problem solve
Inductive in problem solving	Deductive in problem solving
Define themselves by being relationally literate	Define themselves through accomplishments
Prefer to be recognized	Ask to be recognized
Ascertains the exact needs of each team member	Cares more about larger structural needs
Emphasize complex and multi-tasking activities	Single task orientation and completion
Helps others express emotions	Downplays emotions
Directly empathizes	Promotes independent resolution
Cognizant of the specific needs of many at once	Cognizant of the needs of the organization
Verbally encourages and praises	Encourages less feeling and more action
Resolves emotional conflicts to reduce stress	Denies emotional vulnerability to reduce stress

Navigating diversity and complex stakeholder relationships becomes easier when you understand what your body does during difficult social interaction. Neurozone describes what happens in our brains when we perceive (or not) psychological safety (otherwise known as value tagging or social safety). The amygdala (Fight-Flight reaction stations) in our brains unconsciously and continuously ask these questions, in any social setting:

- ➤ How important is this interaction for my survival?
- ➤ Does this space make me feel like I belong?
- ➤ Is this me?
- ➤ Does this interaction give me meaning?

Should the answer be 'no' to any one of these questions, we *feel uncomfortable*, and we are hesitant to engage for fear of possible exclusion. This stands in the way of necessary and possible conflict that the team needs to get creative and innovatively solve problems as a collective. We need diverse teams to engage, even though they feel uncomfortable, and courage allows a team to consciously override the uncomfortable feelings and to engage anyway. Typical courage enablers are:

1. Socially safe environment
   - Social safety is the essential outcome of any operational leadership framework
   - We need social safety to leverage diversity.
2. Skills development, both personal and leadership skills.

From a neuroscience perspective, there is a scientific need for diversity so that we may increase our collective creativity and our collective knowledge (different knowledge). The MIT Center for Collective Intelligence found that equal gender representation brings empathy, innovative solutions, and more ways of doing one thing. They found that diversity and psychological safety equals the highest intelligence. The C factor (collective intelligence) will always be higher in a diverse group than the intellect of any one individual. Neuroscience work by Dr Etienne van der Walt has also shown that creative diversity, problem-solving diversity, and cognitive diversity cannot be achieved without establishing cultural, ethnic, and gender diversity first. We need all forms of diversity to build our own human resilience (Figure 2).

The leader's role in creating social safety

In a diverse team, the focus should always be on social safety first. We need social safety to leverage diversity. The team leader plays a critical role in achieving social safety by establishing bonding; it is the responsibility of the leader to remove the things that impede social bonding (unclear expectations, perceived unfairness, *etc*). This can often be challenging since diverse teams could be the result of man-made, enforced rules, typically driven by political or global agendas. However, we have tools to manage these challenges, like empathy and, most importantly, our ability to establish commonalities. Commonality is typically the ability to create context, to create the common goal and to work from the outside in. Working from the outside in is the narrative of clearly showing what is going on around the boat, clearly showing that the diverse team is together in the boat and that the diverse team needs to avert a specific crisis. The World Health Organization has found that a lack of belonging can lead to a medical syndrome called chronic stress, which results in burn-out and consequently, the loss of team members. We therefore need leadership to create courage enablers, bonding, social safety, and belonging!

Targets and totals for diversity

Before targets, totals, and gap analyses can be considered, the importance of diversity must first be understood.

> *'Many conversations about diversity and inclusion do not happen in the boardroom because people are embarrassed at using unfamiliar words or afraid of saying the wrong thing — yet this is the very place we need to be talking about it. The business case speaks for itself — diverse teams are more innovative and successful in going after new markets.'* Inga Beale, former CEO of Lloyd's of London

Simply put, diversity is important because it leads to significant economic growth (European Institute for Gender Equality). Reducing the gender gap in STEM could help reduce the skills gap, increase employment and productivity of women, and reduce occupational segregation, which will foster economic growth. Increasing the participation of women in STEM would contribute to an increase in EU GDP per capita by 2% (Figure 3), which amounts to €610 billion and an additional 850 000 jobs in 2050.

Therefore, the message is clear, it is advantageous to have a diverse workforce and to have female leaders, as well as male leaders in managing positions. This is a balance, a bridge, a collaboration. Barbara Annis, CEO of Gender Intelligence Group (GIG), advocates the value of gender unity. We need both female and male leadership styles to survive and that is why collaboration is so important! But if diversity and inclusion are so important,

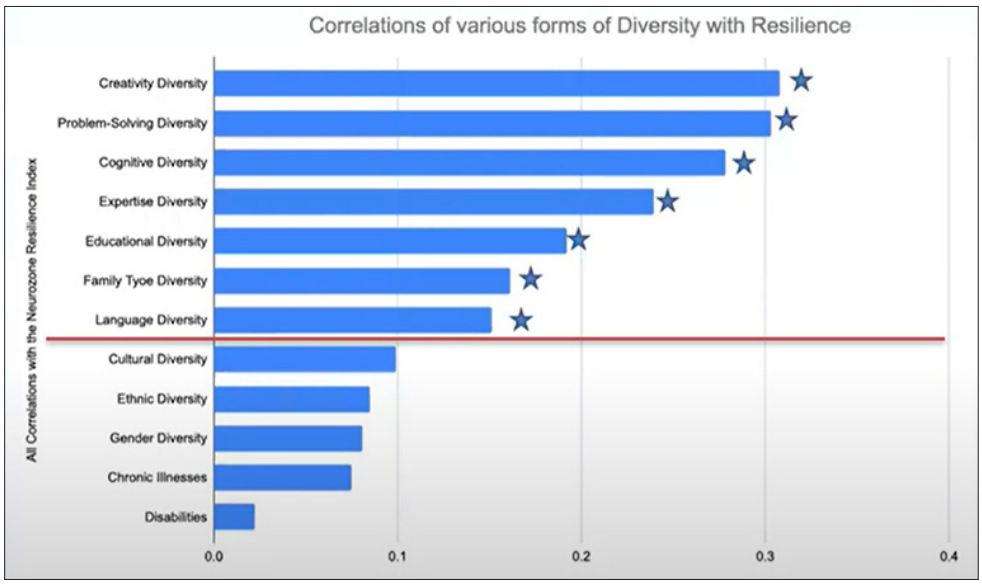


Figure 2—The Neurozone resilience index

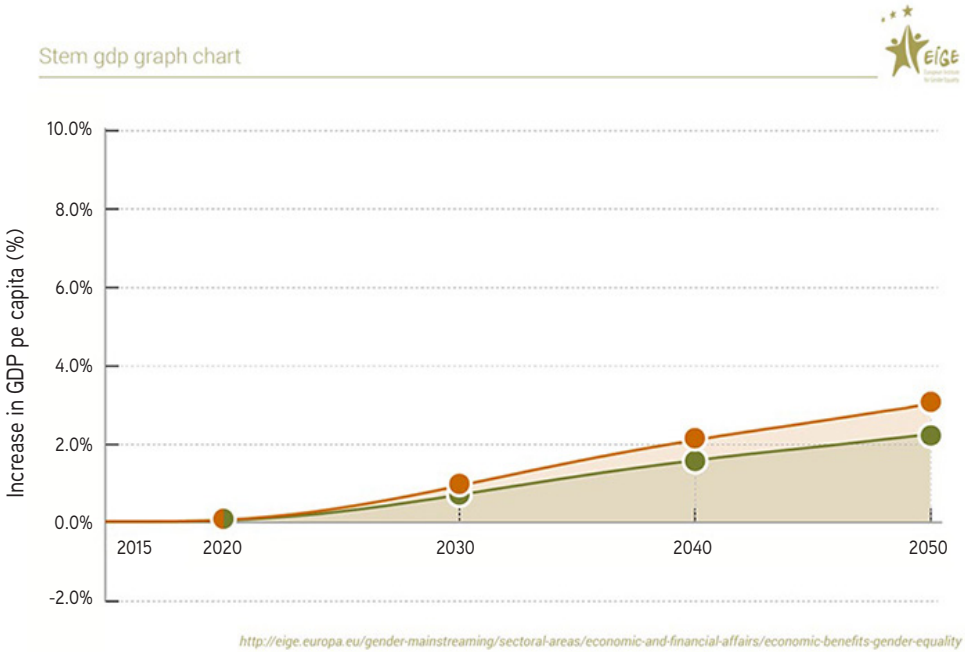


Figure 3—The impact of the STEM gender gap on the EU GDP (https://eige.europa.eu/gender-mainstreaming/policy-areas/economic-and-financial-affairs/economic-benefits-gender-equality/stem)

why are we not reaching our targets? Why, in countries with equal education and opportunity, do women still choose not to enter STEM (Figure 4)? This is known as the global *'educational-gender-equality paradox'* (the more gender equality in a country, the fewer women in STEM). This paradox could have to do with the fact that women in countries with higher gender inequality are simply seeking the clearest possible path to financial freedom. And often, that path leads through STEM professions.

Experts do not have any clear answers; however, they did find that we should focus our efforts on those young, would-be STEM women and form programmes specifically aimed at creating positive environments for girls to interact with STEM ideas (Stoet and Geary, 2018).

We are all standing on a burning platform. Across the world, according to UNESCO, women with degrees in computer science represent only 40% of the total, and those with engineering degrees account for just 28%; cloud computing only 14%, and data and AI only 32%. It seems surreal, but women make up more than two-thirds of the world's 796 million illiterate people (Facts & Figures | UN Women – Headquarters). As regards South Africa, since 1996, when women were first allowed to work in underground mining, women have come to represent only 14% of the total mining workforce. In a study (PISA 2018: Insights and Interpretations) across more than 60 countries, on the level of learning of 15-year-old students, in more than half of the countries involved less than 2% of girls plan to work in STEM. The report shows in Italy, only 1 in 8 girls wants to pursue a career in science (despite excellent achievements in the field).

This trend seems to be prevalent in the USA as well, with less than 20% women in engineering (Figure 5). A US report published

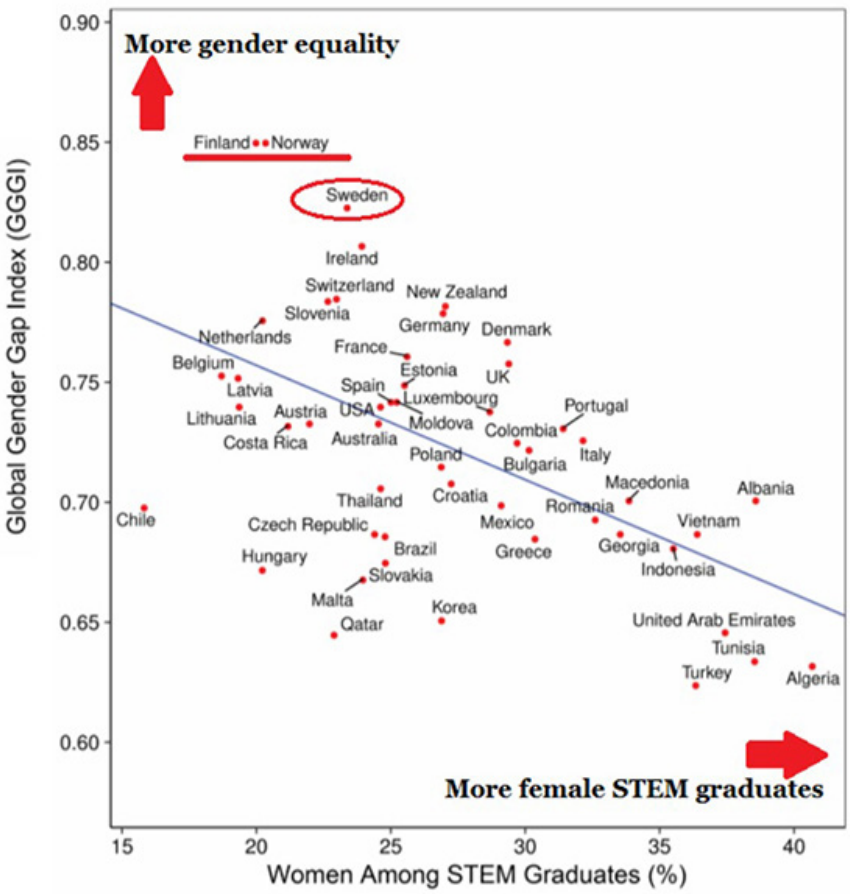


Figure 4—The educational-gender-equality paradox (Stoet and Geary, 2018)

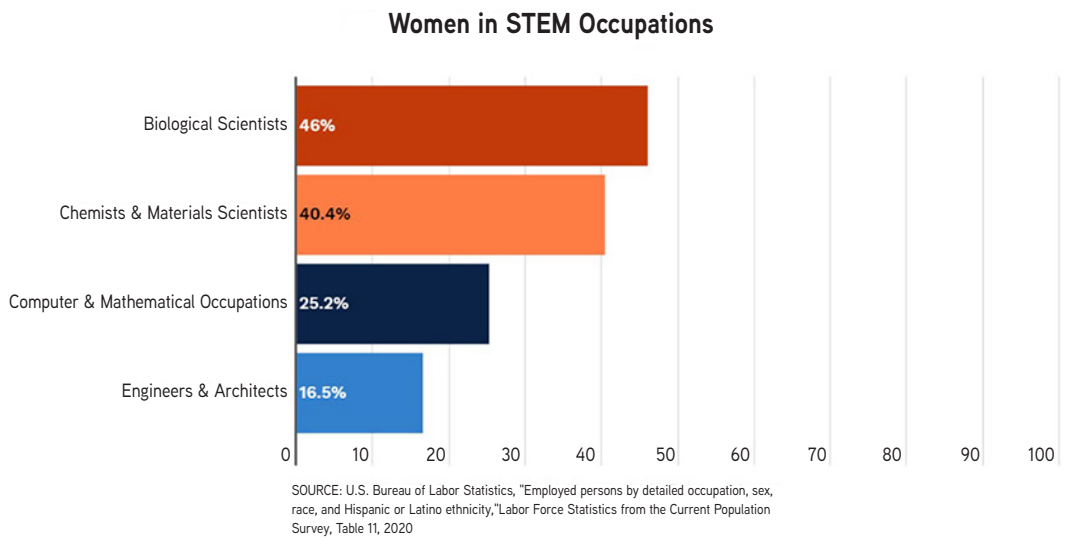


Figure 5—Women inselected STEM occupations(U.S. Bureau of Labor statistics, 'Employed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity,' 2020)

during 2010 indicates that social and environmental factors contribute to the under-representation of women in science and engineering. It is clear that education makes a difference and has an impact, since the ratio of boys to girls who scored above 700 on the SAT math exam at age 13 has shrunk from 13:1 to about 3:1. However, this is not the whole story. Perceptions and unconscious beliefs about gender in mathematics and science have an influence.

The World Economic Forum is asking the same question: 'Why do we need more girls in Africa in STEM ... Why aren't there enough women in STEM-related jobs in Southern Africa?' The World Economic Forum found that gender biases and expectations for different genders, set by families, society, culture, and the media, tend to propagate stereotypes, discriminatory practices, and policies which deter girls from pursuing STEM careers (The Equality Equation Report). Of those women

who complete secondary education, many lack the required proficiencies in numeracy, science, and the digital skills required to enroll and/or excel in STEM-related programmes at the tertiary education level.

Targets and totals for diversity

Literature is rich with experiments clearly showing the presence and impact of gender bias in fields from medicine to education. One simple hiring experiment, done in a laboratory with approximately 200 undergraduate students in groups of around 14 students each, was clear, concise, and the results straightforward (Ernesto Reuben, Columbia Business School, 2014). The participants had to perform an arithmetic task on a computer, summing as many sets of four two-digit numbers as possible during a four-minute period, and then took part in a hiring exercise.

The Brief: Participants were told that they would be paid a small amount according to the number of correct answers they provided and additional money if they were chosen to be hired. (Payment was offered to motivate participants to think hard about the questions and to want to be hired).

Action: Following the arithmetic task, participants were told the number of problems they had solved correctly. The participants were also told that they would repeat the same task and were asked to estimate how many questions they would answer correctly the second time around.

The interview: Before the second task began two participants were chosen randomly to be 'job candidates'. The remaining participants acted as 'employers', tasked with hiring one of the two candidates to perform the second arithmetic task. If employers chose correctly (when choosing the candidate who performed better than the other candidate on the second arithmetic task) they received increased compensation for the study. This was repeated a few times, with other randomly chosen job candidates. Although pairs represented any combination of women and men, the researchers analysed data only when the two candidates in the pair were of different genders.

Results: The results, in summary, are shown in Figure 6.

- Phase 1, based on appearance only: 'Bad' hiring decisions were not gender-neutral, employers were more than twice as likely to choose the lower performing man as the woman when they made a 'bad' hiring decision.
- Phase 2, based on candidate's expressed anticipated performance: Employers still chose a lower-performing man (over a higher-performing woman) 29 per cent of the time. In contrast, employers chose a lower-performing woman only 2 per cent of the time.
- Phase 3, employers were told the actual performance of each candidate in the first task. In this phase, employers chose the top performer 81 per cent of the time. *However*, when employers hired the lower-performing candidate, they were still nearly twice as likely to hire the lower-performing man over the woman.

How do we go about instituting positive change?

The good news is that stereotypes, bias, and other cultural beliefs can change. In South Africa the Minerals Council has published an action plan with seven key drivers (Figure 7). The publication also has a very strong focus on zero tolerance for gender-based violence.

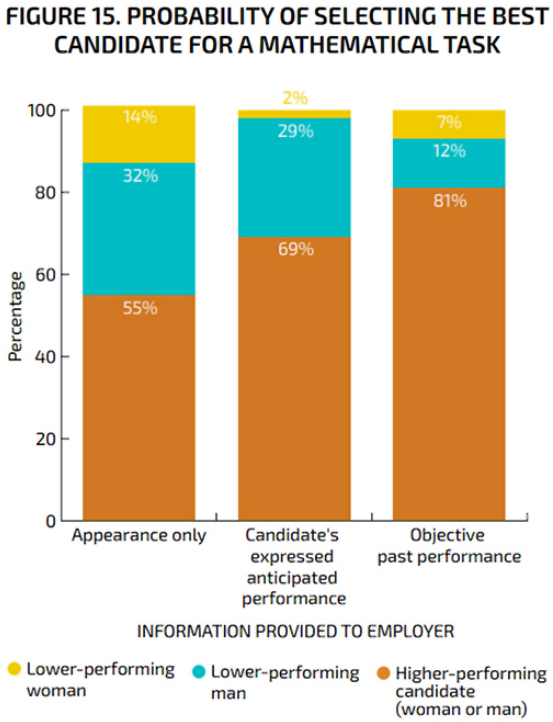


Figure 6—Summary of results from a hiring experiment conducted by Ernesto Reuben, Columbia Business School, 2014

The role of the Minerals Council is clearly outlined in the white paper on diversity and inclusion. When considering these roles and responsibilities, one can ask what the role of an institute like the SAIMM would be. One of the roles that such can play in diversity and inclusion is to provide a platform for networking, collaboration, and dissemination of best practices in diversity and inclusion. Supporting roles could include offering mentorship to young would-be STEM women and openly communicating industry drives for change.

The review of literature on diversity and inclusion shows eight key practices that everyone must commit to executing as part of their sustainable development goals for gender equality. A summary of these practices is given below.

1. Become an active partner. Become aware of organizations that want to provide young girls and women with the STEM education needed. Possible partners can actively participate through financial resources, internship openings, and networking opportunities. Through these partnerships, everyone has the opportunity to become an active part of the solution.
2. Give back. Numerous organizations fund corporate social responsibility initiatives. Financial donations and sponsorships are always needed.
3. Create exposure to best practices in the STEM environment. Identify and invite external guest speakers who can share career inspiration and best practices in diversity and inclusion. Share this platform with young women in STEM. Create opportunities for mentorship, not just with external guest speakers but also with local organizations or educational institutions.
4. Create internships with a focus not only on diversity and inclusion, but also on future needs. Involve young would-be STEM women in emerging technologies like the cloud, AI, and edge computing.

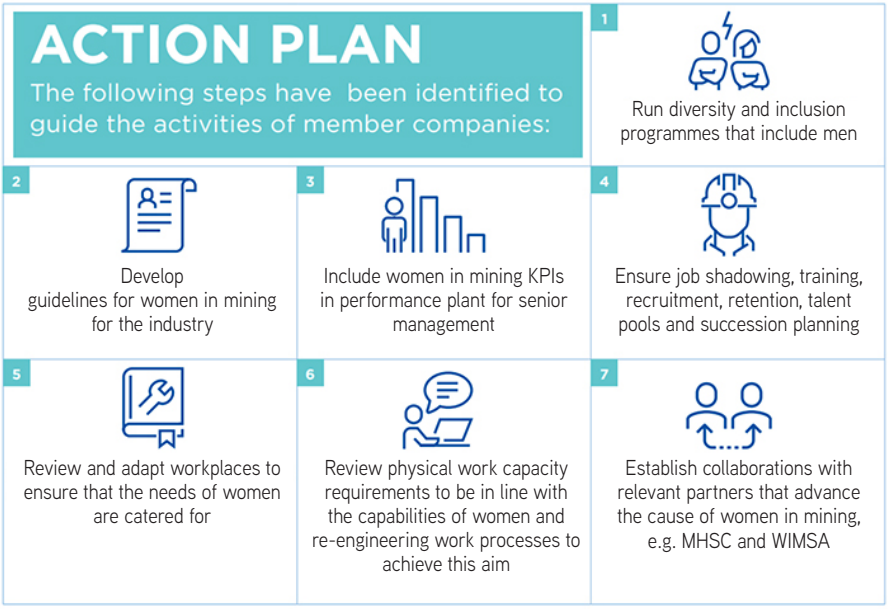


Figure 7—Actionable drivers to promote diversity and inclusion in the mining industry (**Minerals Council, South Africa. Women in Mining, White Paper. 2020**)

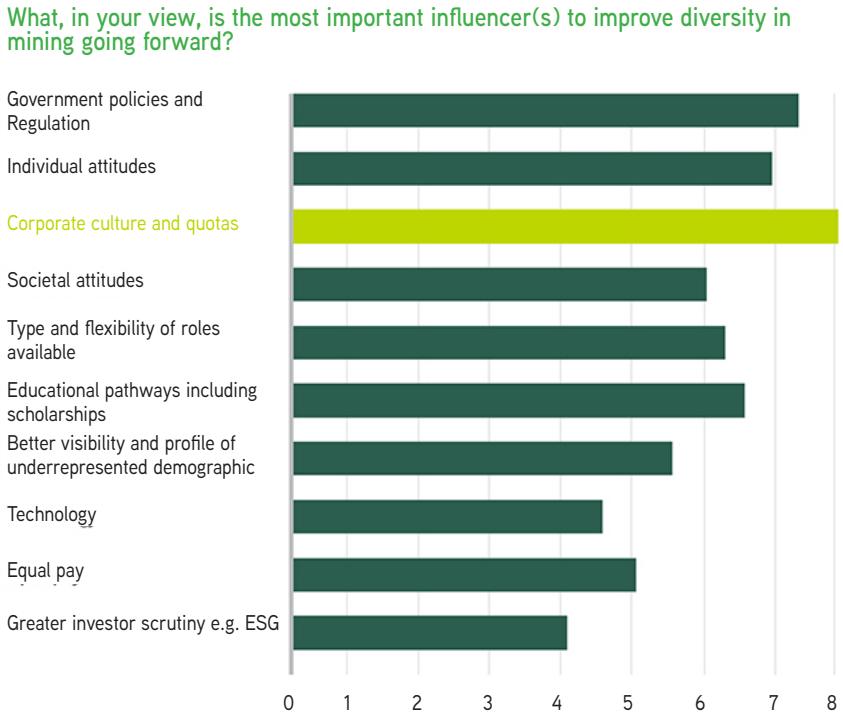


Figure 8—Results from a survey showing corporate culture as a key driver to improve diversity and inclusion in the mining industr (**Hogan Lovells, Africa Legal. 2020. The Future of Mining | Diversity**)

5. Make engineering socially relevant. Papers published by Colvin, Lyden, and León de la Barra (2013) and Tyler-Wood *et al.* (2012) suggest that highlighting the communal aspects of STEM careers increases girls' interest in this field. Therefore, by incorporating the communal aspects and by communicating the societal benefits of engineering, the representation of women in STEM could potentially increase.
6. Cultivate a sense of belonging. This has been proven by the Neurozone work of Dr Etienne van der Walt as well; a sense of belonging has measurable effects on an individual's physical and mental states. The impact of stereotype threats has been found to be alleviated for women in engineering if they had a strong sense of belonging in the team (Shnabel *et al.*, 2013; Richman, van Deilen, and Wood, 2011; Rosenthal *et al.*, 2011; London *et al.*, 2014). Literature suggests a few simple methods of increasing sense of belonging. Firstly, to introduce women to engineering at an early age. Therefore, once again, it's very important to create a positive environment for young would-be STEM girls to engage with engineering. Secondly, cultivate awareness of subtle cues that can

send a message to women that they don't belong in an environment. An examples of this is gender-stereotypical commercials, which have a negative impact on women's aspirations to pursue a career in STEM (Davies *et al.*, 2002). Actively work on changing the representations people are exposed to, emphasize the value that women bring to the table, for example their natural collaboration skills (Derks, van Laar, and Ellmers, 2007), and increase the visibility of women in the industry. Working on these subtle cues can create an environment of belonging where women feel motivated and committed (Walton, Spencer, and Erman, 2013). In an article on the future of mining Hogan Lovells (2020) posed the question: What is the most important influencer that can improve diversity in mining? The results, from 170 participants, showed a clear focus on culture (Figure 8).

7. Education. To reach our diversity goals and targets, we first need to be educated on the importance of diversity, including race, gender, ethnicity, religion, and socioeconomic background. A report by the UN (https://www.unwomen.org) found that education is so important that females will earn 10% to 20% more for each additional year they're in primary school. Therefore, we need to give young would-be STEM women equal opportunities and equal rights of access to resources, which will also lead to global economic development. This is in line with Goal 5 of the 2030 Agenda for Sustainable Development.
8. Learn about your own implicit bias. There is an opportunity to take your own implicit association tests at https://implicit.harvard.edu. On your own diversity journey, it is important to keep your biases in mind. It remains true that implicit biases operate at an unconscious level; however, individuals can actively work on becoming more aware of how and why they make decisions. If bias has an impact on decision-making, take the necessary steps to correct it. If scientists and engineers are made aware of gender bias in STEM fields, teams can work together to disrupt the unconscious thought processes that lead to bias.

Conclusion

Literature is rich with research in the diversity and inclusion space. It has been proven that diversity is needed for economic growth, diverse knowledge, increased collective intelligence, and high-performing teams. However, literature also shows that diversity targets are not always achieved. There is a plethora of factors at play which negatively impact any diversity and inclusion journey; nonetheless, the conclusion is clear. Improving diversity requires conscious effort, decision-making, and active steps. Diversity cannot flourish if safety and a culture of belonging are not created through the power of relationships and meaningful connections. Literature also recommends that a collaborative environment should be created for young would-be STEM women so they can have positive interactions with STEM from a young age, thereby increasing a sense of belonging in the field.

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