GROUPS OF DIVERSE PROBLEM SOLVERS CAN OUTPERFORM

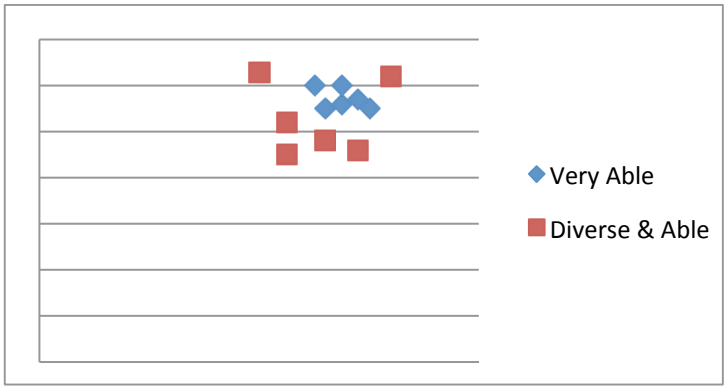
GROUPS OF HIGH-ABILITY PROBLEM SOLVERS

Definitive research on the *Value in Diversity Hypothesis* has been done about the ability of diverse teams to outperform homogeneous teams. This work and the mathematical calculations behind these theorems are part of the impetus in recent years in academic and scientific research on the use of multidisciplinary teams.

The work most noted was done by Dr. Scott Page, a professor of complex systems research and a professor of economics then at the University of Michigan. Professor Page originally set out to create a computer simulation that would demonstrate to the students in his complex systems analysis class that, as the "best and the brightest," they could expect to outperform the competition routinely as long as they applied themselves and worked effectively together as teams. He created a computer simulation in which his team of "very able" students was competing against "able and more diverse" problem solvers. Because his "very able" problem solvers had, by definition, the better problem solving skills, it was his expectation that as a team they would outperform the team of "able and more diverse" problem solvers.

When he ran the program the first time, he was surprised when the more diverse team of problem solvers out-performed the team of "very able" problem solvers. He scoured the program for his programming error, convinced that there must be an errant bit of code somewhere. When he could find no error, he decided to completely re-write the program in another programming language in order to avoid making the same mistake again.

The second program yielded the same result. The "able and more diverse" team of problem solvers out-performed the "very able" problem solvers again. In order to determine what was happening, he reduced the complexity of the problem being addressed to a simple dual variant problem rather than the multivariate problem he had been using. Once he did this, he could graph what was happening in the computer model and he immediately saw why the more diverse team was out-performing the more homogeneous team. Below is what he saw.



As shown in the graphic, the members of the "very able" group were finding solutions that were very good. Their homogeneity caused their very good solutions to be clustered in the upper right hand corner – a sign that their solutions were very good. The "able more diverse" group tended to come up with solutions that were more scattered around the upper right hand corner and the occasional "out of the box" idea prompted the group to develop solutions that were better than the solutions developed by the "very able" group.

Professor Page knew that the power of this computational model would be appreciated by many scientists who work heavily with complex systems computational models. However, his primary field is in economics and he knew that most economists would not accept this concept until he could reduce it to a mathematically supported theorem. He and a colleague took the computer modeling results and wrote a mathematical proof to explain the results. The paper was published in the Proceedings of the National Academy of Sciences.[1]

The paper titled "Groups of Diverse Problem Solvers Can Outperform Groups of High-Ability Problem Solvers," provides the mathematical proof for two theorems: "Diversity trumps homogeneity" and "Diversity trumps ability."

In this initial computer modeling and mathematical proof, Professor Page defined "diversity" as "cognitive diversity" as defined on the previous page. It is this definition of Diversity for which the mathematic proof of the value of Diversity was done. Professor Page's book is **The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies**, (Princeton University Press, 2007). The mathematical proof for the theorems that "diversity trumps homogeneity" and "diversity trumps ability" applies when four conditions are present:

1. **The problem is difficult**
2. **The Calculus Condition** (everyone must be smart; i.e., have some ability to solve the problem)
3. **The Diversity Condition** (there must be diversity among the problem solvers)
4. **Size Matters** (the group has to be more than a handful and be drawn from a large population)

Furthermore, Prof. Page's analysis of all the research that has been done over the past three decades regarding the performance of diverse teams is that identity diversity does lead to cognitive diversity, and the theorem applies to identity diversity. His analysis is that the studies in which diverse teams did not outperform homogeneous teams involved situations in which the teams were not involved in difficult problem solving (condition #1) or **conflict undermined the ability of the diverse team to reach its full potential** or some other factor that resulted in one of the four conditions not being met. For a complete account of the research by Prof. Page, you may want to read his book.[2]

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[1] Lu Hong & Scott Page (2004) "Groups of Diverse Problem Solvers Can Outperform Groups of High-Ability Problem Solvers," Proceedings of the National Academy of Sciences, 101 (46):16385-89.

[2] Scott Page (2007) "The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies," Princeton, NJ: Princeton University Press.