

BOARD # 471: Work-in-Progress: A Strengths Approach Centering Lived Experiences of Low-Income Students in an S-STEM Program

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Eva Schiorring has almost two decades of experience in research and evaluation and special knowledge about STEM education in community colleges and four-year institutions. She presently serves as the external evaluator for four NSF-funded projects. The

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Dr. Fred DePiero earned his BS and MS degrees in Electrical Engineering at Michigan State University. After which he worked at Oak Ridge National Lab in the areas of robotics and machine vision. He then earned his PhD, also in EE, from the University of Tennessee. In 1996 he moved to San Luis Obispo, CA and joined the faculty of Cal Poly in the EE Department. After teaching in EE and then 10 years of service as an Associate Dean, Fred rejoined the faculty and then joined the Computer Engineering Department. His areas of interest have branched out to include web applications for teaching and learning, as well as new approaches to digital-to-analog converters with first and second order holds. Fred retired from Cal Poly in 2024 and now teaches at Hancock College. Development of his CATE system continues (the Circuit Analysis Tool for Education).

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Dr. Lizabeth Thompson is the Director of General Engineering and a professor in Industrial and Manufacturing Engineering. She has been at Cal Poly for 32 years and has held various positions on campus including Co-Director of Liberal Arts and Engineering Studies, Director of Women's Engineering Programs, and CENG Interim Associate Dean. Although she has taught over 25 different courses, she currently teaches Financial Decision making, First Year engineering, Senior Project, and Change Management. Her research is in Engineering Education where she has received \$11.8 million of funding from NSF as either PI or Co-PI. She researches equitable classroom practices, integrated learning, and institutional change. She spent the 2019-2020 academic year at Cal State LA.

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This work-in-progress paper explores the integration and centering of the lived experiences of low-income students into an existing Strengths-Based Approach in an NSF scholarship and mentoring program. Our current NSF S-STEM award ENGAGE (Engineering Neighbors: Gaining Access, Growing Engineers) (NSF DUE 1834128, 1834154) is a partnership between a public, primarily undergraduate, highly-selective, B.S.-granting institution in California and two California Community Colleges designed to support low-income, academically talented engineering and computer science students.

In ENGAGE, we utilize a Strengths-Based Approach (SBA) to support student success in both training and professional development, and in program design and implementation. SBA utilizes Gallup's CliftonStrengths assessment to identify the strengths that students bring to their educational journeys. Research by Gallup shows that the integration of CliftonStrengths has a demonstrated correlation with student retention and well-being [1]. Rooted in positive psychology [2, 3] CliftonStrengths is an online assessment that identifies individuals' top five "Themes of Talent," organized in four leadership domains: Executing, Influencing, Relationship Building, and Strategic Thinking (Figure 1). These patterns of thoughts, feelings and behaviors can be developed into "Signature Strengths" by intentional investment in time practicing, developing skills, and building knowledge [4, 5]. The assessment results enable individuals to identify and begin to understand the value in utilizing the ways and capacities for thinking, feeling and behaving that feel natural to them. Strengths-based development strategies and interventions involve bringing awareness as well as increased and intentional use of signature strengths [6], that there is a wide range of ways to achieve academic and professional success in all fields, including engineering and computer science.

EXECUTING	INFLUENCING	RELATIONSHIP BUILDING	STRATEGIC THINKING
People with dominant Executing themes know how to make things happen.	People with dominant Influencing themes know how to take charge, speak up, and make sure the team is heard.	People with dominant Relationship Building themes have the ability to build strong relationships that can hold a team together and make the team greater than the sum of its parts.	People with dominant Strategic Thinking themes help teams consider what could be. They absorb and analyze information that can inform better decisions.
Achiever Arranger Belief Consistency Deliberative Discipline Focus Responsibility Restorative	Activator Command Communication Competition Maximizer Self-Assurance Significance Woo	Adaptability Connectedness Developer Empathy Harmony Includer Individualization Positivity Relator	Analytical Context Futuristic Ideation Input Intellection Learner Strategic

Figure 1: Clifton Leadership Domains

Figure 2: Selected Gallup Strengths

Strength	Selected Gallup Strengths (used in discussion below)
Analytical	“People especially talented in the Analytical theme search for reasons and causes. They have the ability to think about all the factors that might affect a situation.”
Empathy	“People especially talented in the Empathy theme can sense the feelings of other people by imagining themselves in others’ lives or others’ situations.”
Focus	“People especially talented in the Focus theme can take direction, follow through, and make the corrections necessary to stay on track. They prioritize, then act.”
Learner	“People especially talented in the Learner theme have a great desire to learn and want to continuously improve. In particular, the process of learning, rather than the outcome, excites them.”
Positivity	“People especially talented in the Positivity theme have an enthusiasm that is contagious. They are upbeat and can get others excited about what they are going to do.”

Gallup CliftonStrengths is currently utilized by over 1,000 colleges and universities. More than 90% of Fortune 500 companies have utilized CliftonStrengths. However, many implementations of SBA (including Gallup) do not attend to the varied lived experiences of students, which can shape student development and utilization of their strengths. If we ask, “How has the experience of being a low-income student contributed to or possibly hindered student development and utilization of their strengths?” we might see that (see also Figure 2):

- Financial instability may impact students' ability to fully engage with strengths-based development. Students who struggle to meet their physiological (food, housing, transportation) and safety (job security, financial stability) needs may find it difficult to focus on academic or career-related aspirations.
- A student who is food insecure may find it difficult to apply their *Learner* strength effectively because they are preoccupied with meeting basic survival needs.
- Students with security needs may experience high levels of stress that inhibit their ability to fully tap into strengths such as *Positivity* or *Focus*.

Gallup CliftonStrengths and similar approaches also very rarely provide support for students and supporters to explore how particular majors and career paths matter in strengths development and utilization. For example, which majors prioritize (or seem to prioritize) relationship-building strengths and which strategic-thinking? How are students majoring in a “strategic-thinking major” (for example, *Analytical*) who lead with “relationship-building” strengths (*Empathy*) supported (or not supported) to succeed?

In our initial development and implementation of SBA, mentors and mentees engaged in training activities focused on exploring differences in lived experiences related to a wide variety of identities/factors designed to encourage participants to critically examine their pathways and positionality in higher education. We also began to explore how even within engineering, different majors, disciplines, and career pathways “default” to different strengths prioritization. A primary focus of this work was to, again, demonstrate that there are many ways to be successful in all fields and that students will have more success if they utilize their strengths, even if these are different than student perceptions of what strengths are valued in their fields.

However, we did not focus on what the students in our program had in common: the lived experience of being low-income in the Central Coast of California [7]. Thus, moving forward in the collaboration, we are redeveloping SBA to center attention to the experience of being a low-income student in one of the most expensive parts of the country and plan to start our strengths-based work with new students with this focus. We will encourage students to consider how their strengths can be used not only to succeed in engineering or computer science but also to navigate challenging realities of being a low-income student. We believe that by beginning with the shared experience of being low-income, we will better respond to the lived realities of ENGAGE students, and, ideally, create opportunities for relationship-building and support across all three institutions.

As we close, we want to recognize that the community colleges, while only 40 miles apart from each other, do have different local income dynamics. One community college is in a city with a median household income of \$63,341 and a per capita income of \$20,907 [8]. On the other hand, the second community college in the partnership is in a county with a 2022 median household income of \$90,216 but 10% higher median monthly housing costs. As part of this new phase of our project, we will attend, with the low-income students in our program, to these different contexts shaping their development and utilization of their strengths.

Finally, going forward, we are also interested in how individuals and organizations are prepared to support (or not support) student utilization of their strengths. For example, how do misperceptions about transfer students at the transfer target institution (public, primarily undergraduate, highly-selective) and/or misperceptions about low-income students, potentially limit the ability of low-income transfer students – including ENGAGE students – to develop and utilize their strengths to support their academic and professional success? Another way to ask this question is whether colleges and universities are “strengths ready” for all the strengths of all of our students?

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- 7 NAHB/Wells Fargo Housing Opportunity Index (HOI) <https://www.nahb.org/news-and-economics/housing-economics/indices/housing-opportunity-index>
- 8 US Census (2020-22)