Department of Program Evaluation

Fulton County Schools
Where Students Come First

STEM Magnet Schools

August 2022

Evaluation Questions

1. To what extent are schools offering an integrated STEM curriculum?
2. How is design thinking incorporated into learning and teaching practice?
3. Do students have access to multiple high-demand Career Technology Pathways?
4. How are the schools innovative?
5. What are the enrollment and attendance trends at each school in contrast to other high schools in the district?

Background

Fulton County Schools opened two STEM magnet high schools in the fall of 2021: Global Impact Academy (GIA) and Innovation Academy (IA). The schools had a unique goal: to encourage students to explore their passions and talents by providing multiple high-demand Career Technology Pathways that incorporate design thinking with an integrated STEM curriculum.

Both schools are in new buildings equipped with state-of-the-art science and technology laboratories, collaboration spaces, and practice healthcare facilities. Every student in the district is eligible to apply and later selected by lottery. The STEM schools served only ninth and tenth graders during the 2021-2022 academic year, with plans to enroll a new ninth-grade class next year. All four grades should be represented by 2024.

All first-year students take an introductory Pathways class that provides course credit for all three CTAE Pathways healthcare, information technology, and engineering) before deciding which path to pursue their certification.

In collaboration with Georgia Tech's Center for Education Integrating Science, Mathematics, and Computing, the district developed the CEISMC curriculum, a collection of design thinking tasks created to support STEM learning.

Methodology and Data

The FCS Department of Program Evaluation (DPE) led this evaluation. FCS contracted NORC out of the University of Chicago—an external vendor—to conduct focus groups with students, parents, teachers, and leadership. FCS staff led the recruitment for the focus groups but did not attend the group sessions to maintain the confidentiality of the participants.

Figure 1: Focus Group Participant Breakdown

Participant Type	GIA	IA	Total
School Leaders	5	5	10
Science Teachers	2	5	7
CTAE Teachers	1	5	6
9th Graders	3	6	9
10th Graders	4	6	10
Parents	8	7	15
Total	**23**	**34**	**57**

This evaluation also incorporated school observations to understand better the school's offerings and a secondary analysis of attendance and enrollment data. Propensity score matching was used to create a comparison group of 9th and 10th-grade student similar to those enrolled in GIA and IA. The comparison groups were used to assess the difference in the attendance rate for each school. Students were matched based on their 2021 attendance rate, economically disadvantaged status, race, zone, and gender.

DPE ran a ThoughtExchange, a platform to gather anonymous authentic feedback from stakeholders at the end of the academic year with students and staff. The staff ThoughtExchange also included survey questions regarding design thinking and CTAE integration. Student response rates at both schools were meager and did not produce reliable results. As a result, only the staff responses were analyzed as part of the evaluations.

Figure 2: ThoughtExchange Participation

Participant Type	# of Responses	Total Group #	Response Rate
GIA Staff	10	25	40%
GIA Students	1	296	0%
IA Staff	27	56	48%
IA Students	108	814	13%

Findings

Enrollment

The secondary data analysis of enrollment revealed the 2022 student enrollment with 296 students at Global Impact Academy and 814 students at Innovation Academy. Comparing the schools' demographic composition and surrounding zones, 9th and 10th-grade students revealed that the schools do not have demographic parity with their geographies. Figures 3 and 4 show the school-to-zone comparison for each school.

Both schools had a higher portion of talented and gifted (TAG) students. GIA is over double the rate of the surrounding zones, and IA is 50% higher. Both STEM schools had a significantly smaller proportion of students with disabilities and economically disadvantaged students. IA had half the representation of economically disadvantaged students compared to surrounding zones. STEM schools have less than half as many Hispanic students as their surrounding zones. IA had double the portion of Asian students in the surrounding zone, with lower portions of most other racial groups.

Figure 3: Global Impact Academy AY2022 Student Demographic Zone Comparison

Student Group	GIA	Zones 1-3
English Learner	0%	0%
Economically Disadvantaged	67%	81%
Students with Disabilities	7%	11%
TAG	22%	8%
African American	93%	86%
Asian	1%	0%
Hispanic	5%	11%
Multi-Racial	2%	2%
White	0%	1%

Figure 4: Innovation Academy AY2022 Student Demographic Zone Comparison

Student Group	IA	Zones 4-7
English Learner	0%	4%
Economically Disadvantaged	7%	16%
Students with Disabilities	4%	9%
TAG	52%	36%
African American	12%	17%
Asian	38%	18%
Hispanic	7%	17%
Multi-Racial	5%	4%
White	37%	44%

The STEM schools attracted students who were driven and passionate about pursuing a career in STEM fields. The staff had high expectations for students, but their expectations did not mirror students' academic abilities. Students of all abilities attended the schools, and many students struggled when presented with only rigorous course offerings like honors and AP. Staff noted that the diverse academic abilities were challenging to accommodate in the advanced and accelerated courses. Midway through the year, non-accelerated virtual courses were added.

Attendance

When comparing the attendance rates of these students in AY2021 to AY2022, we see that the attendance rates for those attending IA or GIA increased more than in their respective comparison groups. The comparison of the attendance averages from 2021 to 2022 can be seen below in Figure 5.

Figure 5: Attendance Rate Comparison From 2021 to 2022

Group	2021	2022
Global Impact	88.3%	94.7%
GIA Comparison	88.4%	91.5%
Innovation Academy	95.9%	97.7%
IA Comparison	96.1%	96.7%

Integrated STEM Curriculum

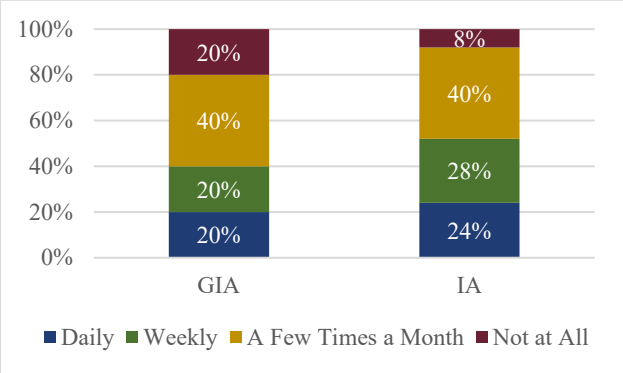
The CEISMC curriculum aimed to have projects that engaged the faculty and students in STEM activities by leveraging problem-solving strategies and collaboration on real-world issues. In reality, the faculty described the curriculum as lacking coherence and required much of the faculty's time to embed it into their classrooms properly.

Staff expected the projects outlined within the curriculum would cross more disciplinary boundaries and spread STEM content in all subject areas. Instead, staff felt the projects were not fully integrated across the curriculum. The curriculum needed to be improved to be applied in general education courses. The most salient element of the curriculum was the design thinking components.

Design Thinking

When asked how often they integrate design thinking practices into their instruction, about 40% of teachers at GIA shared that they integrate it weekly or daily, compared to 52% of IA teachers.

Figure 6: Frequency of Staff Integration of Design Thinking Practices in Their Classes



Design thinking implementation was uneven across the schools. Both schools mentioned using design thinking to craft their school mascot at the beginning of the year. GIA spent some time at the beginning of the year doing "sprint" design thinking cycles so that students became comfortable with the process. IA conducted the potable water project; the English and social studies teachers led research projects on the topic, and the math and science, and CTAE classes worked to design and build a prototype. Although the potable water project at IA was successfully executed, the school struggled with opportunities to discuss each department's role in how they could work together to support the project's goal.

Both schools focused on the importance of empathy in the design thinking process. IA worked is working to hone the socio-emotional design components in their school. They have built an advisement period into their school schedule to assist in the modified design. On the other hand, GIA said they infused empathy into everything they do.

CTAE Pathways

Students' access to career technology Pathways was the most successful piece of the STEM high school curriculum implementation. The Pathways courses were implemented fully within the two schools, with first-year students experiencing all three Pathways (i.e., healthcare, information technology, and engineering).

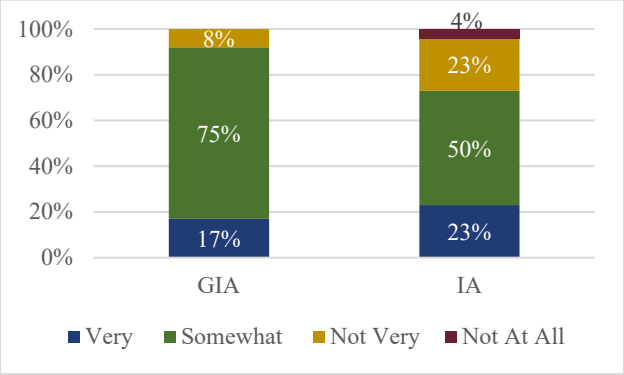
Pathways were designed to expose students to all three fields of study in a way that enabled them to make an "informed decision" about which Pathway they wished to pursue in their later high school years (and potentially beyond). The aim of the Pathways courses is for students to complete a "full sequence of courses in the same industry cluster," at which point they would be eligible for an industry-recognized credential.

The two schools took their own paths to implement the Pathways courses. In the first semester, IA developed the course so that students alternated pathway courses each day (e.g., Healthcare on Monday, IT on Tuesday, Engineering on Wednesday, and starting again on Thursday). Students professed that this configuration was difficult, particularly when maintaining continuity within a project for a particular Pathway. On the other hand, GIA students alternated every two weeks. This meant students could accomplish a short-term project without distraction, but it also meant—as mentioned above—that teachers felt they were starting over regularly. During the second semester, teachers and leadership at IA altered to match GIA, with students alternating Pathways courses every two weeks. As much as the scheduling still has kinks to resolve, the benefit of balancing all three courses during the same time frame meant that students completed and received credit for their introductory coursework in all three Pathways in their first year of high school.

Sophomores at both academies had different experiences with the Pathways course than the first-year students. At IA, second-year students selected their Pathway at the beginning of the school year and only took classes within that Pathway. They did not take the introductory Pathways course with the ninth graders. GIA sophomores, however, were enrolled in the "trio" course alongside freshmen, completing it before committing to a Pathway in their junior year.

Students were mixed on the importance of Pathways courses. Some students said the courses kept them attached to the school; the courses defined what was unique about the school. For others, the STEM curriculum had drawn them in, and the Pathways courses were secondary.

Figure 7: Staff Perception of CTAE Pathway Integration Across Subject Areas



Staff saw the integration of CTAE pathways as an essential component of the STEM Schools. Staff requested more professional development for cross-curricular planning. They also expressed that general education teachers needed more time to experience the CTAE courses and learn more about the curriculum. Overall, most staff at each school believed that CTAE Pathways were very or somewhat integrated across subject areas.

School Innovation

The new buildings and their amenities mattered. Students and parents appreciated their beauty,

natural light, and collaborative spaces. There was puzzlement, however, about the presence of some technologies when students were not yet engaging with them.

Parents at GIA spoke about a lack of extracurricular activities, while IA parents talked about the promise of industry mentors, which had yet to come to fruition. Students were more forgiving, noting that they came because the school facilitated them in reaching their career goals. Students appreciated the hands-on elements of learning and the college-like independent environment. Students wanted more extracurricular opportunities to help build a sense of school pride instead of a sports team.

Limitations and Considerations

The main limitation of this evaluation was the reach of participants. For the ThoughtExchanges, we did not hear back from an adequate portion of the student body which limited the amount of student input in this evaluation.

The schools were involved in the selection process for the focus groups. School leadership selected the staff for the leadership focus group, which included the principal, assistant principal, and academic department heads. School personnel supported recruiting teachers, students, and parents for their respective focus groups. Expectedly, focus group participants skewed towards those satisfied with the school.

Conclusion

In summary, the CEISMC curriculum was partially implemented due to its segmented nature of the curriculum. Staff prioritized course curricula and considered additional approaches to implementation.

Design thinking implementation was uneven across the schools. Both schools centered empathy in the design thinking process.

Students' access to CTAE Pathways was the most successful piece of the STEM high school curriculum implementation. The Pathways courses were implemented fully within the two schools.

The new buildings and their amenities mattered but not all are being utilized. Students love the hands on and college-like environment. Career mentorships and extracurricular clubs are desired.

Recommendations that have surfaced from the evaluation are:

1. Professional Development on the following topics: cross curricular planning with CTAE, expectations on integrating STEM curriculum, familiarize industry experts with instructional strategies
2. Institution at all levels Offer courses at various levels. Ensure teachers are making their courses accessible for students of varying abilities.
3. Explicit infusion of design thinking. Create more synergy, intentional instruction, and a common lexicon around Design Thinking.
4. Mentorship and extra curriculars. Develop the industry mentorship program and STEM related extracurricular options for students.