Access to Powerful Technology as a Catalyst for Career Pathway Engagement

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June 2024

Reinvent the Classroom

Digital Promise | hp | Microsoft | intel

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Suggested Citation

Wortman, A., and Schiner, N. (2024, June). *Access to powerful technology as a catalyst for career pathway engagement [Project Report]*. Digital Promise. https://doi.org/10.51388/20.500.12265/217

Executive Summary

This paper explores the opportunities and affordances presented when historically and systemically excluded (HSE) youth gain access to high-powered technology and tools in their school environment through an innovative program. Many research studies have shown the challenges HSE youth face in accessing high-value occupations, particularly in the fields of Science, Technology, Engineering, and Mathematics (STEM). Despite the increasing demand for STEM jobs, pathways from schools to careers in these fields often lack effectiveness, especially among HSE students. The Reinvent the Classroom initiative, a collaboration between Digital Promise, HP, Microsoft, and Intel, aims to address this pathway challenge by integrating high-powered and effective technology into education. The initiative focuses on the idea that for students to meaningfully find their way to and through career and technical education (CTE) pathways, they must have the opportunity to find synergies among their interests, talents, and skills, and gain access to the required high-powered technologies that fuel powerful learning experiences.

The HP Learning Studio at Anaheim High School serves as a catalyst for this journey, representing a significant step towards increasing student awareness, interest, and engagement in career and technical education pathways through exposure to technology and relevant learning opportunities. The studio provides students with access to high-powered technology and resources, fostering authentic, challenging, and collaborative learning experiences. Examples from Anaheim High School demonstrate how exposure to the HP Learning Studio sparks interest and leads to deep engagement in CTE pathways.

The paper concludes by emphasizing the importance of aligning educational initiatives with student interests and community needs. By providing access to powerful learning opportunities, such as those facilitated by the HP Learning Studio, schools can empower students to pursue their passions and effectively prepare for future careers.

The partnership between the Reinvent the Classroom initiative and Anaheim High School represents a promising approach to bridging the skills gap and promoting equitable access to jobs for the future for all students, especially those from historically marginalized communities. Through the integration of technology and innovative pedagogical approaches, schools can create transformative learning experiences that prepare students for success in the 21st-century workforce. But only by ensuring those technologies and pedagogies are available to all students can schools bridge the gap between K-12, an ever-evolving jobs landscape, and future-ready careers.

Introduction

Pathways to high-value occupations remain elusive for many youth, particularly youth from historically and systemically excluded (HSE) groups. The landmark report, A Nation at Risk (National Commission on Excellence in Education, 1983), pushed for a return to the curriculum basics of English, Math, Science, and Social Studies, to the detriment of other subjects like career preparation and exploration. Scholars have noted that "we're *still* differentiating the knowledge and skills of CTE [career and technical education] from those of academic subjects—both in their separate silos—and we remain challenged in finding common ground" (Pearson, 2019). Meanwhile, the skills gap—the gap between what skills employers need and what skills prospective workers have-–is growing larger, and our school systems are too often failing to adequately address these challenges (Levesque, 2019).

According to the U.S. Bureau of Labor Statistics (2022), by 2030, the total number of STEM jobs will grow by almost 11 percent—increasing roughly 30 percent faster than jobs in the overall workforce, and questions remain of how to increase the diversity of the tech workforce, even in progressive enclaves such as Silicon Valley. Despite this growth, school-to-career pathways remain insufficient for STEM specialties. Even when schools take on STEM preparation, student interest can often be stagnant (ACT, 2016), particularly among historically and systemically excluded students (Wang, 2013). The need for students to be equipped with STEM skills will inevitably grow as emerging technologies continue to infiltrate every sector. Even careers that do not have an explicit STEM component will require STEM skills. Districts and schools are responding to this urgent need with various initiatives such as computational thinking, AI literacy, and articulating a Portrait of a Graduate (Mills et al., 2021; Mills et al., 2024a; Mills et al., 2024b).

Before students can engage with STEM preparation and CTE pathways, they must be exposed to them and be given the opportunity to make direct connections between potential careers, powerful technologies, required skill sets, and their own interests and life experiences. While schools often have dedicated facilities and technologies for their CTE programs, these tools and spaces are rarely accessible to the entire student body. These limitations inhibit the ability of students to use versatile, higher-powered equipment for core coursework and exploration of their passions, creating potential missed opportunities for students to discover their talents and prospective college and career pathways.

One initiative addressing some of these ongoing challenges is Reinvent the Classroom, a collaboration between Digital Promise, HP, Microsoft, and Intel. This white paper provides an overview of the integration of a HP Learning Studio into Anaheim High School, as part of the Reinvent the Classroom initiative, and provides a framework for how to think about moving educators and students towards the goal of expanded awareness, interest, and engagement in CTE pathways. The paper is organized into four sections. In the first section, we introduce the Reinvent the Classroom initiative and the goals and activities of the initiative. In the second section of the paper, we introduce our partner district and school, including the criteria we used to identify the ideal partner. In section three, we propose a working conceptual framework as a lens for how one might think about the integration of powerful technologies into a learning environment and how that integration could provide motivation to move educators towards expanded STEM engagement and students towards expanded STEM occupational identity development. The fourth section of the paper presents an analysis of collected data using the conceptual framework as an organizing structure. We first analyzed interviews and observations through the engagement funnel framework and then examined specific examples for how they reflected the principles of powerful learning. We conclude the paper with an emphasis on the importance of aligning educational initiatives with student interests and community needs.

Reinvent the Classroom

The Reinvent the Classroom Initiative is committed to the transformation of education through the deliberate integration of technology. Through professional learning experiences, storytelling, and educator convenings, Reinvent the Classroom has connected and empowered hundreds of actively engaged educators and countless others through its advocacy and support of "powerful learning with powerful technology." The Reinvent the Classroom initiative includes two programs: the HP Teaching Fellows, a cohort of innovative K-12 educators across the US and Canada who demonstrate and amplify powerful teaching and learning with HP, Microsoft, and Intel technologies, and the HP Spotlight Schools program.

HP Spotlight Schools—launched in 2019—are innovative secondary schools in the United States committed to powerful teaching and learning with technology. When visitors enter the HP Learning Studio, they witness practical and replicable applications of powerful learning across grade levels and subject areas, including authentic, personally relevant lessons that challenge students and encourage collaboration, inquiry, and student reflection. HP Spotlight Schools are also characterized by a school culture that embraces instructional innovation with support from leadership. The 2023-2024 Spotlight School program focuses on the following:

- The launch of a HP Learning Studio, featuring high-end HP workstations running Windows 11 and powered by the latest Intel processors, scholastic esports peripherals, and prosumer-grade audio-visual and broadcasting equipment

- Customized professional learning and support for the school's administration and faculty

- Induction of school educators into the HP Teaching Fellows and other Reinvent the Classroom programming

- School-Community-Industry partnerships to support the Learning Studio's impact on CTE awareness, interest, and engagement.

Building upon the foundation laid by the Reinvent the Classroom initiative and the HP Spotlight Schools program, we embarked on a search for an ideal partner to further our vision of transforming education and broadening the school-to-career pathway.

Introducing Anaheim High School

Our district and school partner were selected to advance our vision of creating replicable examples to broaden the school-to-career pathway. In recruitment, we identified the following criteria for our ideal partner:

- a high school serving historically and systemically excluded population(s)
- a strong, consistent leadership team
- innovative programming and pedagogical approaches already in place
- connections to local community colleges and universities
- and a vision for a Learning Studio that serves as a hub for student creativity, professional learning, and community-centered opportunities.

Our search led us to Anaheim Union High School District (AUHSD), a member of the Digital Promise League of Innovative Schools—a network of districts that show promising educational leadership, commitment to college and career readiness, and emphasis on student voice and innovation. Following a series of meetings with AUHSD leadership, Anaheim High School was selected due to their work in those key areas. We highlight key criteria and discuss how Anaheim High School embodies those below.

Demographics

Located in Orange County, California, Anaheim High School is a large urban high school of 2750 students with 94% Latinx/Hispanic students and 92% of students receiving free or reduced lunch. Built in 1898, Anaheim High School is the third oldest high school in Orange County and embodies a space that respects its history, while keeping a firm eye to the future through its strong community initiatives and innovative programming.


Exterior of Anaheim High School, taken October 24, 2023

Community Centered

Recently named a Community School, Anaheim High School is committed to 1) integrated support services, 2) expanded and enriched learning time and opportunities, 3) active family and community engagement, and 4) collaborative leadership and practices. The Community School model uses an asset-based framework and commits to rethinking and sometimes rebuilding community relationships based on a strong foundation of mutual trust and respect (Partnership for the Future of Learning, 2018). As Vice Principal Ciara Perez put it, "We really believe in the vision of the Community School model. The high school is just like a city in itself, because of the history, the multiple generations, and alumni. Everyone has had their ups and downs and different experiences of what Anaheim has been through the last 125 years." Their position as a Community School was a special distinguishing feature for this school because of its implication for broader impact: If school is the center of a community, then Anaheim High School's embracing of that role will see this work's impact and reach multiplied.

Innovative Programming

In addition, Anaheim Union High School district recently integrated the Career Preparedness Systems Framework (CPSF), a holistic framework that addresses interests, integrates career learning with academic coursework, and aligns career pathways to the demands of the local labor market (Inflexion, 2023).

Figure 1. The three pillars of the AUHSD Career Preparedness Systems Framework
Image provided by Anaheim Union High School District
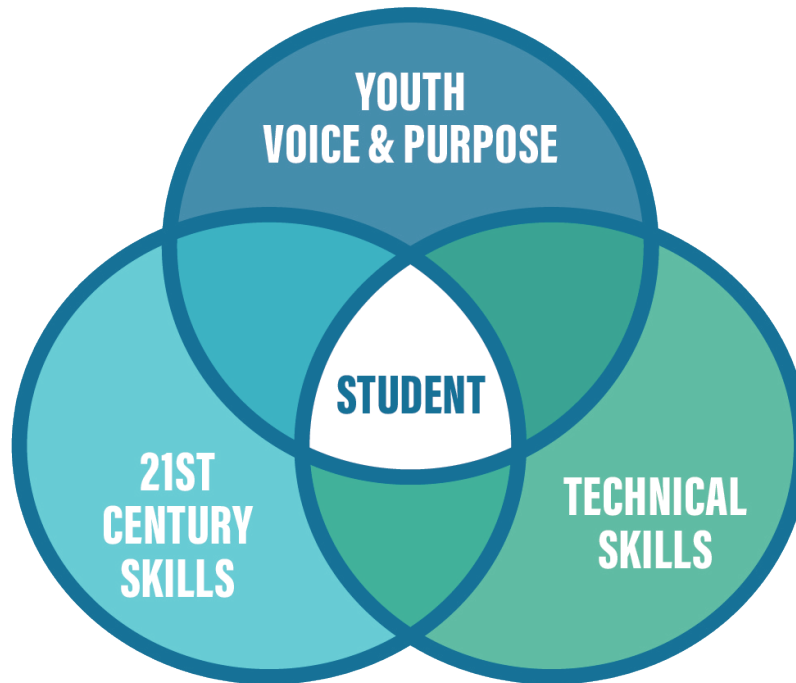
The Anaheim CPSF includes multiple innovative features to make sure stakeholder voices are involved in the career preparedness process:

- The Anaheim Collective: a coalition of local partners including the City of Anaheim, local community colleges and universities, businesses and nonprofit organizations

- The Anaheim Innovative Mentoring Experience (AIME): hands-on experiences, summer internships, and leadership development workshops for high school students

- Regional Occupational Programs (ROPs): hands-on learning, technical skills and certifications

- Six-year CTE plans: Starting in 7th grade, students meet with counselors to explore career interests and opportunities in school and out of school

- Career Technical Pathways: career pathways embedded in AUHSD high schools

- Dual credit programs with community colleges

- Youth voice and civic engagement initiatives

- The AUHSD Incubator Lab (iLab): a space for students to invent and innovate products and solutions with a focus on social entrepreneurship

- Asset-based approaches to language and cultural diversity

Anaheim High School's principal, Ruben Calleros, underscores the importance of the CPSF and the community voice approaches in relation to preparing students for their futures:

> *Our district's instructional model is our CPSF, our Career Preparedness Systems Framework, ultimately we're trying to prepare students for meaningful jobs and futures. In listening to our partners, both our college and community partners that our district has... first and foremost, employers want to see the soft skills developed, which we call the 5C's: communication, critical thinking, collaboration, and creativity. Can you solve problems on your own? And what we call the most important one—character and compassion...Second, we're going to give them technical skills: the content, how to write, how to use software, how to do math. And then the third component is helping our students find their voice and purpose. If our students feel that their voices are being heard, they can dictate what they are trying to learn and, in turn, will be more engaged. That is what we are ultimately trying to achieve with our capstone program.*

Anaheim High School has eleven career and technical education pathways, including the only bio-technology pathway in the district. The goal of the HP Learning Studio is to amplify the work already happening at Anaheim High School and to create additional opportunities for all learners to become more aware, interested, and engaged in their career pathways. The HP Learning Studio shines a light on innovative practices and technologies that are available to Anaheim High School students by opening up a space that is not tied to any one teacher's class or club. By providing a space with access to broadcasting, graphic design, podcasting, computer science, audiovisual, and esports equipment, students who are not currently enrolled in CTE pathways can explore their interests and perhaps decide to pursue CTE coursework going forward.

In Fall 2023, Digital Promise's Reinvent the Classroom team and Anaheim High School entered into a partnership to create a HP Learning Studio on campus that reflects the needs and interests of the students and staff. Our team conducted a needs assessment and established a leadership team of innovative educators to serve as ambassadors to the Learning Studio. In addition, we sent a survey to all teachers and staff and conducted interviews with the leadership team, administrators, and students. These activities were used to inform the selection of the space for the HP Learning Studio, as well as the technology and equipment to be purchased. As outlined above, AUHSD's Career Preparedness Systems Framework, Anaheim High School's commitment to community and youth voice and CTE pathways, and the goals of the Reinvent the Classroom initiative aligned to provide for the perfect partnership for a HP Learning Studio.

Conceptual Framework

The conceptual framework for this paper is adapted from Callahan et al.'s (2019) report on the influences on occupational identity in adolescence, in which they reviewed and synthesized research and youth-facing programs that seek to influence occupational identity and vocational outcomes. Callahan et al. devised categories of influence on occupational identity based on their review and represented these influences as segments of a funnel that included exposure, engagement, and participation. For this study, we use that framework as the foundation for a narrowed funnel of influences on occupational identity. Recognizing that we would not reach deep levels of participation within the implementation timeline, we focused our attention on the earlier stages of influence to create an "engagement funnel" of awareness, interest, and engagement, where awareness and interest are a more nuanced view on exposure. Our analysis explores the process of moving both educators and students along this engagement funnel as a result of the introduction of the HP Learning Studio on campus. Having both educators and students move deeper through the funnel is in service to the same goal: for more HSE students to have access to the technological resources that enable them to pursue their interests and expand their future aspirations, specifically as it leads them to try out potential CTE pathways. The HP Learning Studio also puts the idea that powerful technology leads to powerful learning opportunities into practice.

The Engagement Funnel

In analyzing data from participant observations and educator and student interviews, we believe the integration of the HP Learning Studio into the Anaheim High School campus has the potential to increase awareness, interest, and engagement in career and technical education pathways long term. We predict that students and educators will first gain **awareness** of the HP Learning Studio and the technology and resources offered through the Anaheim High School educator leadership team, and at the ribbon-cutting launch event. As awareness grows, **interest** in the space will also increase, as students spread the word about the Learning Studio and a wider group of educators start to plan ways to integrate the space into their coursework. Long-term interest will spark sustained **engagement and participation** from students and educators alike, and we expect that students who may have sat on the sidelines of CTE coursework will potentially see themselves in occupations and careers they previously wouldn't have considered. That is, students' occupational identity may shift to align with career activities they see mirrored in the HP Learning Studio, such as broadcasting, software development, or games-based occupations.

Figure 2. The Engagement Funnel
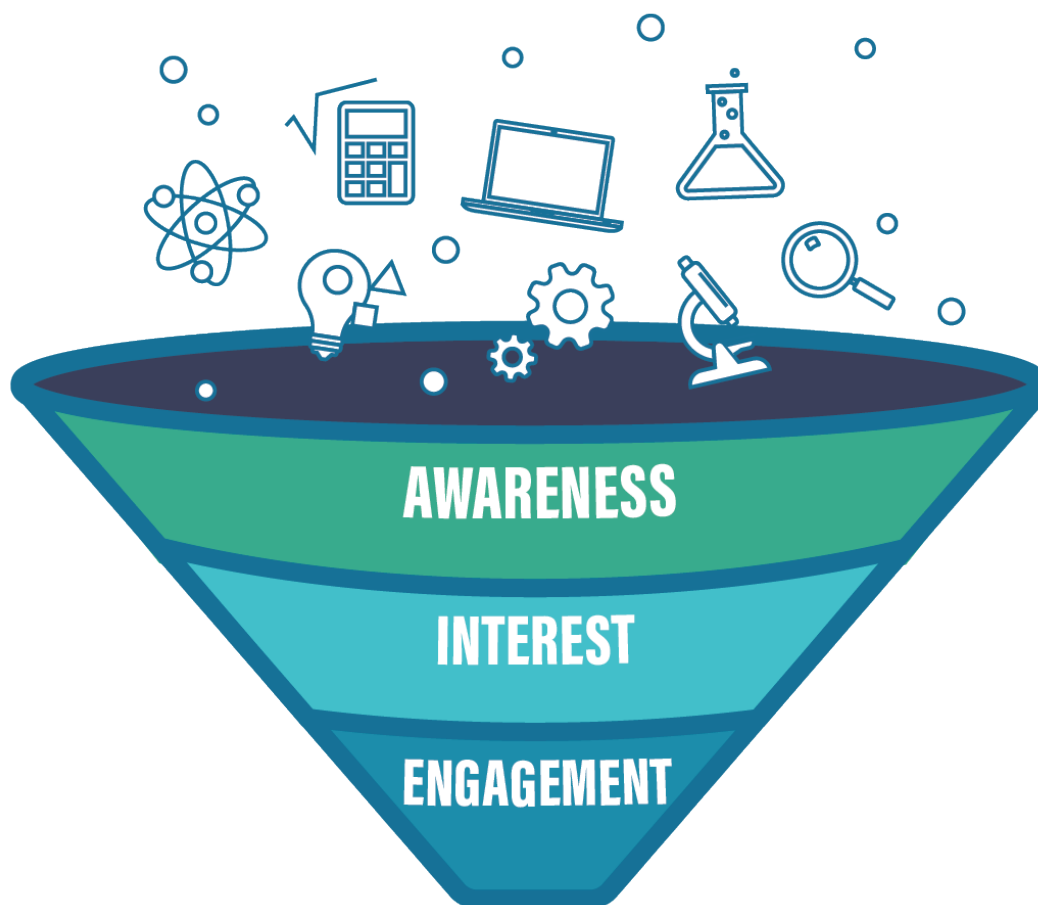
As STEM education moves more towards problem-solving, experimentation, experiences, and hands-on learning (Grimes, 2022), the HP Learning Studio provides a space for students to test out future occupational personas in a low-stakes environment, as our analysis will show. Scholars have suggested that occupational identity development is an underexplored factor in improving pathways to occupations for youth, and occupational identity is particularly important to historically and system-ically excluded groups (Callahan et al., 2019). We believe that successful occupational identity devel-opment can lead students deeper down the funnel of engagement. Access to relevant technologies and sustained and meaningful experiences of **powerful learning** can increase awareness, interest, and engagement in CTE pathways and better prepare students for the future.

Powerful Learning

Powerful learning is a set of principles that guide educators to design learning experiences that meaningfully engage students. Powerful learning is personal and accessible, authentic and challenging, collaborative and connected, and inquisitive and reflective. The HP Learning Studio exemplifies the powerful learning principles in numerous ways. Learning that takes place in the Learning Studio is **personal and accessible** in that it provides students with opportunities to invest in and make decisions about their paths and products. The Learning Studio creates opportunities for HSE students who have not traditionally seen themselves or those in their community as part of the innovation economy to find their passion and pursue their interests. The fact that the Learning Studio is located in the center of campus, and is not tied to any one teacher's class or club makes it more accessible to all students and educators. Students can engage in **authentic and challenging** projects in the Learning Studio that serve their communities and prepare them to become the next generation of leaders and change-makers. Multiple studies have shown that young people often describe authentic, project-based STEM environments as more motivating and psychologically safe because they are making genuine contributions to a shared and purposive project (NAS, 2021; Ito et al., 2018). In the Learning Studio, students work together in ways that are **collaborative and connected** to create products as learning artifacts that can be shared locally or even globally. The types of projects that students can create in the Learning Studio can be tied to more informal interactions and more holistic connections between mentors and peers. The powerful learning principle **inquisitive and reflective** is seen in the Learning Studio in the way that students show up. Students feel free to ask questions, identify problems, investigate and create solutions, and reflect to iterate on their designs. The HP Learning Studio creates a safe space where it is ok to fail and keep trying, thus transforming "hard" or "boring" STEM subjects into engaging and surprising experiences that open doors to new possibilities.

In the sections that follow, we will share the details of the launch of the HP Learning Studio at Anaheim High School, and then move on to analysis of the data collected. The analysis sections are organized by movement through the engagement funnel (e.g., awareness, interest, and engagement) and we provide illustrative examples of educators and students that embody each transition. Our analysis also calls out specific examples that reflect powerful learning principles within the data.
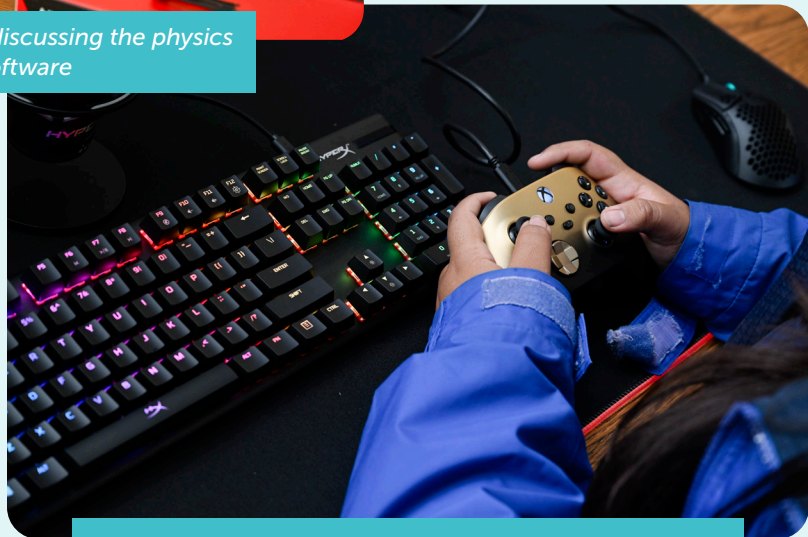
Launching the HP Learning Studio

In Winter 2024, the Anaheim High School HP Learning Studio was officially launched during a ribbon-cutting ceremony that featured school and district leaders, students, members of the community, and representatives of Digital Promise, HP, Microsoft, and Intel. The needs assessment indicated that Anaheim High School would benefit most from a space that focused on access to high-powered HP desktop workstations and prosumer-grade audio-visual and broadcast equipment.

When selecting equipment for the Learning Studio, versatility, power, and long-term value were the core tenets of the decision-making process. Powered by top-of-the-line graphics cards and the latest Intel chipsets, the HP Z Series workstations housed in the Learning Studio are capable of running everything from the latest scholastic esports titles to 4K video editing and streaming software and resource-intensive 3D design suites. Perhaps most importantly, the modularity of the PCs allows for the machines to be updated and upgraded, as needed, for years to come.

Mr. Vargas and his student discussing the physics simulation software

Band students checking out the esports HP Z machines

During the launch event, stations were set up and helmed by educators and students to show what the Learning Studio is capable of. Upon entering, visitors were greeted by Mr. Vargas and his students running sophisticated physics simulations on the Z Series workstations, previously unavailable due to hardware limitations. Further back were more Z Series machines; however, these featured a revolving group of students displaying their prowess in *Rocket League* and *Fortnite* running at high frames per second due to the graphical and processing power of the workstations and high refresh rates of the HP Omen monitors. In the corner, you could find a HyperX ProCast podcasting station, with Ms. Barba's students interviewing several VIP guests. The last station featured Mr. Duarte's students coding EV3 Mindstorms robots for competition and demonstrating programming in game design.

Ms. Barba and her students recording a podcast using the new HyperX ProCast equipment

A student showing off his EV3 Mindstorm robot and coding assignment to Michael Campbell, Senior Director & General Manager, Education Client Division, Intel

Analysis and Findings

As part of our analysis, we recorded, transcribed, and coded all interviews and observations using the conceptual framework as an organizing structure. We first analyzed interviews and observations using the coding scheme of the engagement funnel framework, and then examined specific examples for how they reflected the principles of powerful learning. As we discuss each of the stages in the funnel of engagement, it's important to recognize that movement along the funnel is not necessarily linear and that awareness, interest, and engagement are interrelated. We focus our stories on the transitions between awareness, interest, and engagement, and the ways in which powerful learning is reflected within them.

Awareness

Awareness, in our context, refers to the initial stage in which students or educators become cognizant of a topic, concept, or learning opportunity. It involves knowing about the possibility of a subject matter. Awareness is crucial because it lays the foundation for deeper engagement and learning to occur. Awareness is also tied to exposure, a condition of being subject to some effect or influence. When people are exposed to representations and artifacts, such as role models, media, instructional content, or new technologies, they may be influenced in how they value and identify with different occupations and activities (Callahan et al., 2019). Callahan et al. (2019) noted that exposure that is more personalized, situated in cultural context, and personified by specific individuals is more power-ful than simple dissemination about occupations. By conducting a needs assessment to personalize the space, and situating the technologies and artifacts within the cultural context of the school, the HP Learning Studio constitutes a space that exposes students and educators to new possibilities.

In an interview, 12th-grade student Yahaira shared the power that awareness can have to move students toward deeper engagement. After the ribbon-cutting launch event of the HP Learning Studio, in which she experimented with the podcasting station, Yahaira explained how other students at the school came to her to find out more about the space:

> *A bunch of people asked me about it, like, 'What's in there or what can you do in there?' And I explained to them: they gave us new gaming systems. They gave us a new podcast system. They gave us a green screen system. And a bunch of new cameras. And they're like, 'Oh, I want to go in there...can I go in there now?' I'm like, 'I'm pretty sure you can. You've got to ask.' People have really liked it, especially everybody who was there the first day for the ribbon cutting. I saw all the band kids get on to the gaming system and they were having a blast. The people at the broadcast table with me, we were talking, and they liked it. I asked them afterwards when it ended, how do you feel about the new classroom? And they told me, 'Oh, it's amazing. It looks fun. It looks like something you can literally spend a whole day in there.'*

As expected, awareness of the new HP Learning Studio started to build among educators and students alike. As students became more aware of the **personal and accessible** learning opportunities available to them in the space, buzz around the space grew, and they started to actively seek ways to start using

the technology and tools for projects and to deepen their interests. Yahaira also noted how exposure to the opportunities in the Learning Studio can help some students broaden their ideas of what they are capable of in the future: "It opens a bigger field for us because some students are very limited to what they think school is about. But it's not really like that. There's a bunch more opportunities…So I think that that program and the new studio will open up a bunch of eyes."

Health and physical education teacher Mr. Castelli exemplifies an educator that is forming an aware-ness around technology after being exposed to what he can do in the HP Learning Studio space with his students. His awareness and movement along the funnel is in service to his students and their interests. Mr. Castelli said, "The way [the Learning Studio] was presented to me on how I could use it, that was the motivating factor. Because I can help some students engage in some things that they're interested in." The lesson that Mr. Castelli is best known for throughout the school is his Blue Zones lesson. Blue Zones are communities around the world that are known for having some of the longest-lived and happiest populations (Bluezones.com). While Mr. Castelli has often taught about the Blue Zones in the same way over the years, he was enthusiastic about the prospect of infusing new technologies into the lesson and allowing students to present what they've learned in new and inno-vative ways. Not shy about being behind the curve in terms of technology adoption, Mr. Castelli shared personal insights from his call with Digital Promise's Learning Experience Designer Kelly McNeil: "Kelly even said, 'Wow, the kids might know more than you. This might be really cool because then they could end up teaching you and you'll go on with at least a little more knowledge or experience of this stuff.' And so, you know, that was kind of neat to hear." Mr. Castelli is also considering integrating some **collaborative and connected** technologies into his Blue Zones lesson by thinking of ways he might be able to have virtual exchanges between people in Blue Zone communities and his students.

Math teacher Ms. Khadige considers herself to be relatively tech savvy, but is only in the beginning stages of integrating the use of technology into her practice. She recognizes that math tends to be more traditional in how it is taught, and she is aware that adding more powerful technology into her teaching would be of great service to her students: "I want to be able to help students learn and have them enjoy the learning. I sometimes come off as a strict teacher just because the math classroom still kind of looks like the old-school classroom, but I just want them to want to do it…It's a little bit of a challenge when I still need to use mostly pencil and paper for notes and that kind of thing."

The addition of the HP Learning Studio helps educators like Ms. Khadige and Mr. Castelli try out powerful technologies that they don't have access to in their classrooms in the service of their stu-dents exploring their future interests. For example, Ms. Khadige believes that a strong math foundation can lead to numerous career possibilities, and with the high-powered technology in the Learning Studio she can explore advanced data analytics and game-based learning lessons and projects. Mr. Castelli wants to take his students' passion for a healthy lifestyle and knowledge of fitness and nutrition learned in his classes to the next level with technology projects in web development and entrepre-neurship. They both demonstrate that once students and educators are aware of the possibilities technology presents, they are more likely to actively explore, interact, and, ultimately, deeply engage with the learning experiences facilitated by these tools. Ms. Khadige adds, "My dream would come true if I could get that middle group [of students] more involved and get them really jazzed about school and their future career paths."

Interest

Interest, in the context of education, refers to a state of curiosity, enthusiasm, or motivation toward a particular topic, subject, or learning experience. When students or educators are interested in a subject or content, they are more likely to actively participate, invest effort, and exhibit a genuine desire to learn and understand. Interests can span multiple domains of a person's life, and "are not innate, but rather discovered and cultivated within particular social and cultural contexts" (Ito et al., 2013, p. 64). A person's demonstration of interest is grounded in personal preference, as well as whether they can relate to the culture, people, and practices that embody the interest (Ito et al., 2019). In that way, the embedding of the HP Learning Studio within the school and community culture of Anaheim High School allows for meaningful and relevant interest exploration for both students and educators. It's important to note that learning is meaningful and resilient when interests are supported across settings, for instance when a student who games with friends at home connects his interest in gaming to the esports team at Anaheim High School, and is able to create a game in his AP Computer Science class using the HP Learning Studio.

Twelfth grader, Yahaira, reflected on how access to a space like the HP Learning Studio, that is not tied to any one teacher's class or club, allows for interest development across a wider swath of students:

> *I think people going in there and walking around and testing out the equipment will really get people interested in being in there and engaged. Everyone who was there at the beginning, you could see all the students light up because of the new equipment. And I'm pretty sure all those students want to go back. I feel like if you just give people the taste of it, the view of it, and let them try it out or see what it's really about, people will get interested and be engaged in it. The students that are not really involved a lot, if you get them in there, they'll get involved. So I feel like that's the way to go and just give them a little taste of it and they'll be interested.*

By providing a space with access to powerful technology that is often used by professionals, students who are not currently enrolled in CTE pathways or who don't see themselves as STEM-minded can explore their interests and perhaps decide to pursue CTE coursework going forward. The Learning Studio allows for **inquisitive and reflective** activities, where students can feel safe to try on new identities and occupational personas without fear of failure.

Entrepreneurship teacher and CTE Department Head Ms. Barba illustrates the educator transition from awareness to interest within the engagement funnel. Ms. Barba teaches business, marketing, and entrepreneurship classes and is keenly aware of the career pathways students are most interested in. She's aware that technologies exist that would make it easier for her students to market themselves and their products, such as podcasting and broadcasting equipment, and she's aware that her students are motivated to use them. While Anaheim High School has a video production CTE pathway, access to the equipment is limited to students enrolled in the pathway. The HP Learning Studio on campus, with its prosumer-grade broadcasting, podcasting, and shoutcasting equipment, fills an important need for the student body and specifically for Ms. Barba's classes. Andrew, one of Ms. Barba's 12th-grade students, notes the importance of access to these technologies for him and his fellow entrepreneurship classmates: "Previously the only program that had a green screen and access to professional cameras was our media production class. But now students can go and do their projects in [the HP Learning Studio]."

We see Ms. Barba moving through the funnel of engagement as she takes her awareness and moves towards plans to use the new technologies available to her to make her lessons more meaningful and relevant to her students. She explained, "I try to make my lessons relevant. So something that they can learn right away and use every day... You have to bring real life to what you're doing overall. I think our district is doing very well to have them engage in real-life activities. A lot of the other work that I see is very practical, and it's hands-on. And the students expect that. They want that. They want to see relevancy." By integrating new technologies into her already engaging content, Ms. Barba is making her lessons more **authentic and challenging**. Her students engage in projects where they create or find solutions to problems in the community, and then once a year they are allowed to market or sell their products or services: "I always hear from other teachers saying, 'You know, this is the one thing that brings the whole school together.' Because they're buying and others are talking to each other. The students say, 'Oh, they were talking to me in Spanish and maybe I don't speak Spanish, but I'm still going to make a sale.' It's just everyone working together."

Physics teacher Mr. Vargas is another example of an educator transitioning from awareness to interest within the engagement funnel. When he was a student teacher in a nearby district, he was aware of and had access to sophisticated physics equipment, sensors, and technology that could run simulations. But when he tried to run similar software on the computers at Anaheim High School, he found they weren't able to keep up: "We tried 3D modeling once and [the students] found that super enjoyable because the 3D modeling program we use is kind of like *Minecraft*. Essentially, they kind of build together. But they were extremely frustrated when the computer crashed and they had to restart the whole thing...Again, that's where the better computers come into play, because they would be able to do that."

With the knowledge that the Z Series workstations in the HP Learning Studio run Microsoft Windows 11 and are powered by state-of-the-art graphics cards and Intel chipsets and are therefore able to handle more sophisticated graphics, Mr. Vargas quickly moved from awareness to interest in gaining access to the Learning Studio. Having access to the necessary tools to make his content more engaging, Mr. Vargas is better able to make his class more **personal and accessible** for his students. Now students who may have found physics boring or irrelevant to their lives may be able to see themselves as someone who likes science, or even someone who might pursue a degree in physics in the future, thus developing their occupational identity. Twelfth-grade student Andrew sums up the concept well: "[The HP Learning Studio] is going to open doors for many students. It's going to open their eyes in ways that they didn't have previously, and it's going to allow them to explore different careers that they maybe weren't considering before."

Engagement

Engagement, or the level of involvement, enthusiasm, and active participation demonstrated in the learning process, can occur when students participate in educator-guided activities that are project-based and hands-on. The outcomes of deep engagement in learning activities are skill development, where students gain skills and knowledge relevant to future occupations, and self-efficacy, where students can see themselves succeeding in a future career pathway (Callahan et al., 2019). Self-efficacy is often developed when students experience success when engaging in challenging activities. Educational interventions aimed at developing occupational identity tend to focus on engagement in activities that develop skills and mirror activities seen in occupations, such as project-based learning, student clubs, competitions, and makerspaces.

Interest is often a precursor to engagement, sparking the initial desire or motivation to become involved in a learning experience. Engagement can be characterized by sustained effort, attention, and interaction with the learning materials, tasks, or environment. The HP Learning Studio at Anaheim High School provides a space for students to engage in **authentic and challenging** activities that prepare them for future STEM pathways. Interests can smoothly transition into active engagement when students have access to resources, and when lessons and programs are tailored to the unique needs, cultures, and identities of the group, such as is seen in the Learning Studio. Principal Mr. Calleros shared his thoughts on integrating the Learning Studio on campus and how he sees it contributing to long-term engagement with both students and educators:

> *I think, how do we spark that intrinsic motivation to learn? Not because of the grade and not because of the content. But because, you know, learning is good, and only through learning can we make this world better. Can you make your life better or can you really sustain what you're trying to do? So I want to say, the kind of engagement that we're seeking is when it's incorporating the soft skills and the student voice and choice. We're not quite there yet. But having said that, I think we're definitely moving in the right direction. We have great teachers that are making adjustments to their instruction so that it is more relevant, that it actually sparks kids' curiosity and they want to learn, and then even using grading practices that are not about just grading busy work, but more grading about what the kid can do...equity-based grading and performance-based grading.*

Yahaira, introduced above, is an example of a student who is deeply engaged in her future pathways as a result of her coursework and the addition of the HP Learning Studio. She shared that in the future, she is interested in running her own make-up or skincare business and potentially starting her own podcast. During the ribbon-cutting launch event, she and some friends engaged with the podcasting equipment and interviewed several VIP guests. Her experience engaging with the podcasting technology helped develop her skills and deepened her interest in pursuing podcasting in the future. She said:

> *It's amazing to see, like, the behind the scenes of what really becomes a podcast. And how the equipment works, like I didn't know that the headphones they wear is so they can hear the other person. It's really cool and the whole setup and how it works and everything. I thought it was amazing. Because like I said, I love podcasts. I love listening to them when I'm doing homework or I'm washing dishes or anything like that. I just love listening to people talk about topics and opinions. So I thought it was really amazing and me and my friends joke to this day that we should have a podcast.*

Yahaira's participation in an **authentic and challenging** project in the Learning Studio helped develop her self-efficacy and her belief that she could succeed as a podcaster in the future. Because Yahaira linked her genuine interest in podcasting to a shared and purposive project, she felt motivated and psychologically safe to try on new occupational identities (NAS, 2021; Ito et al., 2018).

Mr. Duarte, previously a math teacher, and now in his first year teaching computer science, is a key example of an educator at Anaheim High School who has transitioned along the engagement funnel from awareness to interest to engagement. Mr. Duarte has also seen his students move through the funnel to deep engagement with some of his lessons. While he sees sustained engagement among some of his students, he has also struggled with making more students aware of the software and systems development CTE pathway. He shared his concern that the pathway may not continue to run unless more students become aware: "This year we have spent time trying to inform students about the courses we have available. Trying to spark interests with things they may like: video games, robotics, and website design. We have been recruiting students by pushing into classes and sharing the projects that students are working on. We also have been sharing the different career opportunities that may be available to them if they pursue computer science." To increase interest among students that may potentially join the CS pathway, Mr. Duarte had his current students overhaul the website that lives on the CTE pathway homepage. He encouraged students to think **inquisitively and reflectively** about what might draw new students into the pathway and gave his students the agency to authentically "sell" computer science to their peers:

> *I tasked my AP computer science class with redesigning our school's CTE webpage and creating a Software and Systems webpage in order to sell computer science to prospective students and parents. It was discouraging that our CTE Pathway Homepage looked like it was made in the '80s and didn't have any information about our software and systems development pathway. Student groups created multiple webpages and we voted on the one that we thought was best to put on the school's website. They included course descriptions, yelp style reviews, sample projects, careers in the field with salary ranges. They were able to use their HTML, CSS, and Javascript knowledge to try to solve the real-world problem of recruiting students into our computer science pathway. They did an excellent job on the webpages and we have increased the number of computer science courses taught at our school by one for the upcoming school year.*

Mr. Duarte also employs **authentic and challenging** projects that deeply engage his students to solve the problems they see around them. As noted above, self-efficacy is developed when students succeed at challenging activities. For their final project, Mr. Duarte's students will be asked to find "clients" among the community, be it other teachers, students, or family members, and to build a website or program that solves their client's problem. The students will build a prototype, write up a proposal, and get feedback from their client on how to improve the prototype. Knowing that they have the skills necessary to complete the project and provide a useful service to someone else provides for a deeply engaging experience for the students and builds self-efficacy. One example of a client is Mr. Castelli and the Blue Zones website he wants to build to showcase his students' work. Mr. Duarte talks about pitching the project to his students: "A couple of the students were like ohh—I saw their eyes light up, like, 'He needs this. I could do that. I already know what he's saying. I already know what he wants.'" This final project also represents learning that is **collaborative and connected**; it is helping to create points of collaboration amongst educators as well as students. Students in Mr. Castelli's class will be exposed to new technologies and tools in the Learning Studio, as well as the near-peer mentorship of Mr. Duarte's students while they help Mr. Castelli's students showcase what they've learned. Mr. Duarte is an example of an educator that is highly engaged in his content and his coursework and is constantly looking for ways to keep his students engaged. His students have recently been asking about Unity and game development, and the HP Learning Studio will provide a space for his students to explore and ultimately engage with this new interest.

Conclusion

"Being able to have a lab that's open and we have easy access to is crucial, because a lot of the computers here live in classrooms we don't have access to. That is why having a computer lab that's for the school community is so important. Especially in our area where you have a lot of students who don't have Wi-Fi access at home and they're just on the District Hotspot or students have to go to Starbucks or McDonald's to do their homework. They're going to be able to come to the Learning Studio and not just do homework, but like, oh, let's go design something. Let's work through some coding and I think that's going to be something that's going to open the doors and kind of essentially get our kids off the streets. Because a lot of students are going home to issues…and this is going to keep them out of the house, keep them involved in something, and essentially build up their resumes and post-secondary plans."

— Andrew, senior student

The collaboration between the Reinvent the Classroom initiative and Anaheim High School illustrates a promising pathway towards addressing the challenges of preparing historically and systemically excluded students for high-value occupations in STEM fields, while at the same time showing there is always work to be done in terms of moving towards greater engagement. As awareness builds around the HP Learning Studio in the school, we expect more and more educators and students to become engaged in using powerful technology for powerful learning. By leveraging the power of technology and innovative pedagogical approaches, the introduction of the HP Learning Studio at Anaheim High School serves as a beacon of hope, providing students with access to transformative learning experiences that foster awareness, interest, and deep engagement in CTE pathways.

The engagement funnel framework presented in this paper highlights the importance of guiding students and educators through a journey that starts with awareness and culminates in sustained engagement. Examples from Anaheim High School demonstrate how exposure to the HP Learning Studio sparks interest among students and educators, leading to meaningful engagement in CTE pathways. Through authentic, challenging, and collaborative learning experiences, students develop the skills, confidence, and sense of purpose needed to pursue their passions and succeed in the workforce of tomorrow.

As we look toward the future, it is imperative that educational initiatives continue to prioritize equity, access, and student-centered learning. By creating spaces with equitable access to powerful technology like the HP Learning Studio, schools can empower all students, regardless of their background or circumstances, to realize their full potential and contribute meaningfully to society.

In essence, the journey towards equitable and inclusive education requires collective effort, vision, and commitment. The partnership between the Reinvent the Classroom initiative, Digital Promise, HP, Microsoft, Intel, and Anaheim High School exemplifies this collaborative spirit, offering a blueprint for how schools can harness powerful technology to create more equitable and impactful learning environments. By embracing innovation, fostering student agency, and cultivating a culture of continuous improvement, we can pave the way for a brighter future for generations to come.

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