System Alignment through Participatory Action Research in a Health Pathway Community of Practice

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Abstract

This two year participatory action research study was set in the context of a regional health pathway community of practice (CoP) focused on:

a. identifying systems changes needed to align K-12 and community college pathways
b. expanding pathway curricular alignment and early college coursework
c. improving transitions and success particularly for students who are under represented in the health workforce.

Relationship building between faculty across K-12 and community college systems built understanding of the contextual differences between high school and community college systems, which was found to be a critical factor in aligning pathway programs of study and facilitating student transitions. The action research cycle within a cross-system community of practice resulted in key findings in two categories: the use of CoPs to effectively develop cross system pathway alignment in an industry sector, and challenges and possible approaches to strengthening health pathways across secondary and postsecondary systems.

Keywords: participatory action research, community of practice, health pathway, system alignment

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Introduction

California's expansion of regional efforts to align K-12 and postsecondary educational systems in order to build career pathways has created new avenues for developing pathway faculty leadership in sector-specific communities of practice.

A community of practice is "a group of people who share a concern, set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002). One such community of practice (CoP) was formed in 2012, when faculty in the Sacramento City College Allied Health Learning Community began building relationships with two secondary health pathways, one at River City High School, the other at Arthur A. Benjamin Health Professions High School (HPHS), (Collins, 2014).

The innovative health pathway leaders who participated in the CoP aimed to establish an organizational model to support collaboration among faculty, counselors, and administrators of K-12 and community colleges in order to find ways to improve the transition of high school students to college. They worked to develop training modules and documents that could support scaling up a secondary-to-postsecondary CoP model focused on student transitions between systems (Collins, 2014). Supported by the Health Workforce Initiative and the Career Ladders Project's California Community College Linked Learning Initiative (CCCLLI), members of that initial CoP mapped programs of study, visited each others' classrooms, aligned curriculum, developed articulation agreements and dual enrollment courses, and worked with industry partners to identify the "Critical Six Soft Skills" essential to health pathway careers (Health Workforce Initiative). This initial effort gave birth to a broader health pathway CoP that engaged in participatory action research, which is the subject of this study.

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Background

Context of the Study

Expanding this small cross-system health pathway CoP to include other colleges and districts in the region was expected to generate progress in three priority areas:

a. identifying systems changes needed to align K-12 and community college pathways
b. expanding pathway curricular alignment and early college coursework
c. improving transitions and success particularly for students who are under represented in the health workforce.

At the outset, cross-system collaboration and alignment was spurred by the state's investment in Career Pathways Trust Grants in 2015, which funded K-12 and postsecondary consortia to develop and align pathways. The California Community College Board of Governors also endorsed and acted on recommendations from a Task Force on Workforce, Job Creation and a Strong Economy (2015) further highlighting and bringing resources to regional systems alignment and pathway development efforts. Moreover, the California Endowment invested in health pathway workforce development as part of a comprehensive initiative targeting low-income neighborhoods, "Building Healthy Communities." Those contextual factors set the stage for education leaders to establish the goal of expanding that CoP from a single college working with two high school health pathways to a more regional CoP.

This project used a participatory action research (PAR) design, which is an ongoing organizational learning process and a research approach that emphasizes co-learning, participation and organizational transformation (Greenwood, Whyte, & Harkavy, 1993). The fact that CoP members did not share an organizational context was a complicating factor. While shape and definition of career pathways vary by industry sector and region, pathway differences are particularly striking between K-12 and postsecondary education systems, as the student populations, systemic norms and faculty culture differ greatly. By using a PAR approach, K-12 and community college leaders intended to establish a generative structure for exploring and piloting changes that each system needed to accomplish in order to align curriculum, instruction, and programs of study within an industry sector. CoP faculty shared common interests in aligning pathway curriculum to improve student success in transitions, developing student supports, eliminating disparities in student outcomes, and improving student achievement. The essential research question undertaken by the health pathway CoP was broad:

> How can a health pathway community of practice work across systems to improve health pathway students' success transitioning into and completing postsecondary health pathways, particularly for underrepresented students?

To contextualize that problem of practice this paper will first define college and career pathways and the initiatives that drive pathway systems alignment from secondary through postsecondary systems. Then we will examine the value of the CoP, as a form of professional learning community focused on problems of practice. We will next describe how PAR methods were adjusted to adapt to the cross-system nature of a health pathway CoP, including the theoretical logic underpinning the processes established in the CoP, and the various levels of CoP participation. The data presented from this research will be primarily process data and outcomes as defined by the logic model: relationships, innovations, programmatic changes, and the initiation of systemic changes within both K-12 and postsecondary systems. Outcomes related to changes in student achievement are not within the scope of this study. Finally, the lessons that grew out of the PAR approach within a CoP fall into two categories: learnings about how to structure CoPs in order to effectively develop cross system pathway alignment; and learnings about health pathway alignment challenges and possible approaches to strengthening health pathways across secondary and postsecondary systems. As this report is being written, the Capital Region Health Pathway CoP continues to meet, work, reflect, and redesign their K-14+ health pathways.

College and Career Pathways

Career pathways are developed across both educational and workforce development systems. The 2016 Workforce Innovation and Opportunities Act Sec. 3, Def. 7 (Congress, 2014), defines a career pathway as a combination of rigorous and high-quality education, training, and other services established to prepare students for the full range of secondary or postsecondary education options within a specific industry sector. Strong research findings show such pathway programs significantly improve student motivation, credit attainment, high school graduation, and postsecondary earnings, particularly for underserved students of color (Guha et al., 2014; Kemple, 2004; Kemple & Willner, 2008; Visher & Stern, 2015; Warner et al., 2016).

High school career pathways differ from earlier vocational programs by their integrated focus on both college readiness and career technical skills. "Each pathway includes not only challenging technical courses but also core academics redesigned to help students understand how mathematics, science, social studies, and language arts are used in the industry that is the organizing theme of the pathway" (Hoachlander, 2007, p. 2).

"Each pathway includes not only challenging technical courses but also core academics redesigned to help students understand how mathematics, science, social studies, and language arts are used in the industry."

Secondary career pathways differ from college pathways in many ways. High school pathways are far more likely to integrate programs of study around interdisciplinary faculty teams. High schools work only with adolescents, preparing them for the full range of postsecondary options in a broadly defined career field. College pathways, on the other hand, tend to be narrower in scope, serve an adult student population with more specific career goals, and general education courses required for degrees or transfer are rarely connected to the pathway. College pathways

prepare students to achieve certificates or degrees, to transfer into higher education, and to attain high value jobs.

While secondary and postsecondary education systems differ greatly, both emphasize attaining equitable student outcomes through career pathways by providing:

a. rigorous, sequential and clearly articulated coursework
b. transition supports between pathway levels
c. multiple entry and exit points to support learners at various stages in their education
d. a focus on careers and engaging employers in the education process
e. counseling and support services to promote student progress and completion

(Kazis, 2016, pp. 1–2; Career Ladders Project & Jobs for the Future, pp. 3-7). Secondary pathways often include integrated work-based learning, articulated and/or dual enrollment courses, and other supports for smooth transitions to postsecondary institutions (Lekes et al., 2007).

Systems Alignment

Research on mature programs of study (Alfeld & Bhattacharya, 2013) that emphasized facilitating students' transition to college, dedicated staffing to advising students and creating linkages between colleges and local high schools, and involved local industry partners found a positive impact on credits earned, grades, and student-reported motivation and preparation to make college and career choices. When compared to other students in the same major at the same college, students from such programs had higher gpas, took fewer remedial courses, and were more likely to complete certificates and degrees.

"Both state and national education leaders have recently emphasized the value of aligning the educational institutions that prepare people to enter or develop their capacities within career fields."

Both state and national education leaders have recently emphasized the value of aligning the educational institutions that prepare people to enter or develop their capacities within career fields, and have increased the resources available for alignment efforts in order to improve access to college and career opportunities. Career pathway systems alignment is an effort to create a cross-cutting system of pathways that aligns all the various institutions and stakeholders in education and workforce development:

> A career pathway system is the cohesive combination of partnerships, resources and funding, policies, data, and shared accountability measures that support the development, quality, scaling and "dynamic sustainability" of career pathways and programs for youth and adults (Alliance for Quality Career Pathways & The Center for Law and Social Policy (CLASP), 2014).

Alignment across systems does not occur easily or automatically. Identifying the specific linkages that each system could make to facilitate pathway students' success in and transitions between systems is a far cry from engaging the people within the systems to make those changes. However, California has seen an infusion of resources and support for developing and aligning career pathways.

Two such initiatives were vital to the CoP studied here, providing key leadership and resources. The California Career Pathway Trust grants established cross-system consortia to develop and align pathways. In the greater Sacramento region, these consortia provided health pathway coaches, industry specialists, and remuneration for teacher professional development. Second, the Governor's Career Technical Education Pathways Initiative (SB1070), assigned "sector navigators" in ten critical industry sectors, each with regional deputy sector navigators charged with supporting systems alignment. The deputy sector navigator for health in the Sacramento region was a key leading member of the CoP. SB1070 funding also supported professional development for faculty involved in both the CoP and the Summer Institutes.

"Because career pathways function within specific industry sectors, systems alignment efforts necessarily involve workforce development stakeholders beyond the two education systems."

Because career pathways function within specific industry sectors, systems alignment efforts necessarily involve workforce development stakeholders beyond the two education systems. Philanthropic foundations in the health pathway sector, as well as both private and non-profit health care organizations, California State University (CSU) and University of California (UC) health pathway teaching programs, and healthcare employee associations have all contributed resources and leadership to this health pathway CoP. Examples include: the Critical Six Soft Skills teaching modules; contributions of time, guest speakers, food and site visits for the Summer Institute; funding for high school health pathways serving low income populations underrepresented in the health workforce; and funding for the CCASN researcher providing technical assistance, documentation, and drafts of findings.

Communities of Practice

The term "community of practice" was originally developed by theorists Jean Lave and Etienne Wenger and had its foundations in learning theory (Lave, 1991). According to Wenger, (2011), "Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (p. 1). A CoP requires...

a. a shared domain of interest,
b. a community that engages in joint activities and encourages reciprocal learning
c. a shared practice (pp. 1-2).

Some of the activities that may be undertaken within a CoP include: problem solving, exchange of experiences, coordination, documentation of events or projects, site visits, mapping knowledge, and identifying gaps (pp. 2-3). CoPs exist in a variety of sectors, including business, health, social welfare, and government, and may go by many names.

In K-12 education, CoPs are often called professional learning communities (PLCs) (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). They can support continuous learning and capacity building among practitioners, help improve instruction and student learning, and facilitate implementation of school reforms (Hord, 1997; Little, Gearhart, Curry, & Kafka, 2003; Wilson, 2016). They appear to be most effective when focused on inquiry into problems of practice (Horn & Little, 2010). Schools offer many examples of CoPs that function within and across disciplines or grade levels. Although more often used for organizational improvement, CoPs have also been used to align technical assistance work between education, workforce development, and social service agencies (Johnson & Bremer, 2005) and to develop career pathway linkages across secondary and postsecondary institutions (Antrobus, Bird, Asrani, & Padilla, 2014).

"CoPs build collaborative community within a common area of interest among those responsible for addressing problems of practice."

CoPs build collaborative community within a common area of interest among those responsible for addressing problems of practice (Wenger et al., 2002), such as the problems involved in aligning pathways between education systems. In order to sustain an effective CoP, the literature suggests there are a minimum of five conditions that must be met:

- Supportive and shared leadership,
- Shared vision and values,
- Collective learning and application of learning,
- Supportive conditions
- Shared personal practice (Bolam et al., 2005; Hipp & Huffman, 2003; Hord, 1997).

As career pathway systems develop through state and local policy efforts, the ground-up practical learning about how to facilitate student transitions and career-based learning through a coherent program of study that crosses over those systems is enhanced through practitioners' interactions in a CoP focused on those problems of practice (Hughes & Karp, 2006).

Research Design

Design-Based Research

This research was co-designed by a team, hereafter referred to as the "Leadership Team," composed of district and site leaders from both K-12 and community colleges, as well as health pathway coaches and leaders from two regional consortia funded through the California Career Pathways Trust grants, the regional deputy sector navigator, two foundation representatives, a University of California graduate-level health pathway program, and a University of California-based researcher. The Leadership Team's purpose in expanding the previously existing CoP and embedding a participatory action research process was to explore and pilot high priority, equity-based changes in two educational systems, in order to address a key problem of practice: far too few students successfully make the transition from secondary to postsecondary health pathways and careers, particularly from low income communities and communities of color.

Principles of design-based research were applied to this research design. Design-based research addresses a systemic problem of practice by learning first about the problem: who it affects and how, how it relates to the current system, what conditions cause variation, and how the problem is embedded in the current system (Anthony S. Bryk, Gomez, Grunow, & LeMahieu, 2015). With a problem of practice centered squarely on the unsuccessful transition of students across education systems, the top priority goals established for the CoP by the Leadership Team, were to build relationships, and develop cross-system understanding of each others' programs and systems. Only then could participants identify and pilot changes in their respective educational systems.

Participatory Action Research

Design based research uses cyclic iterations of a research process:

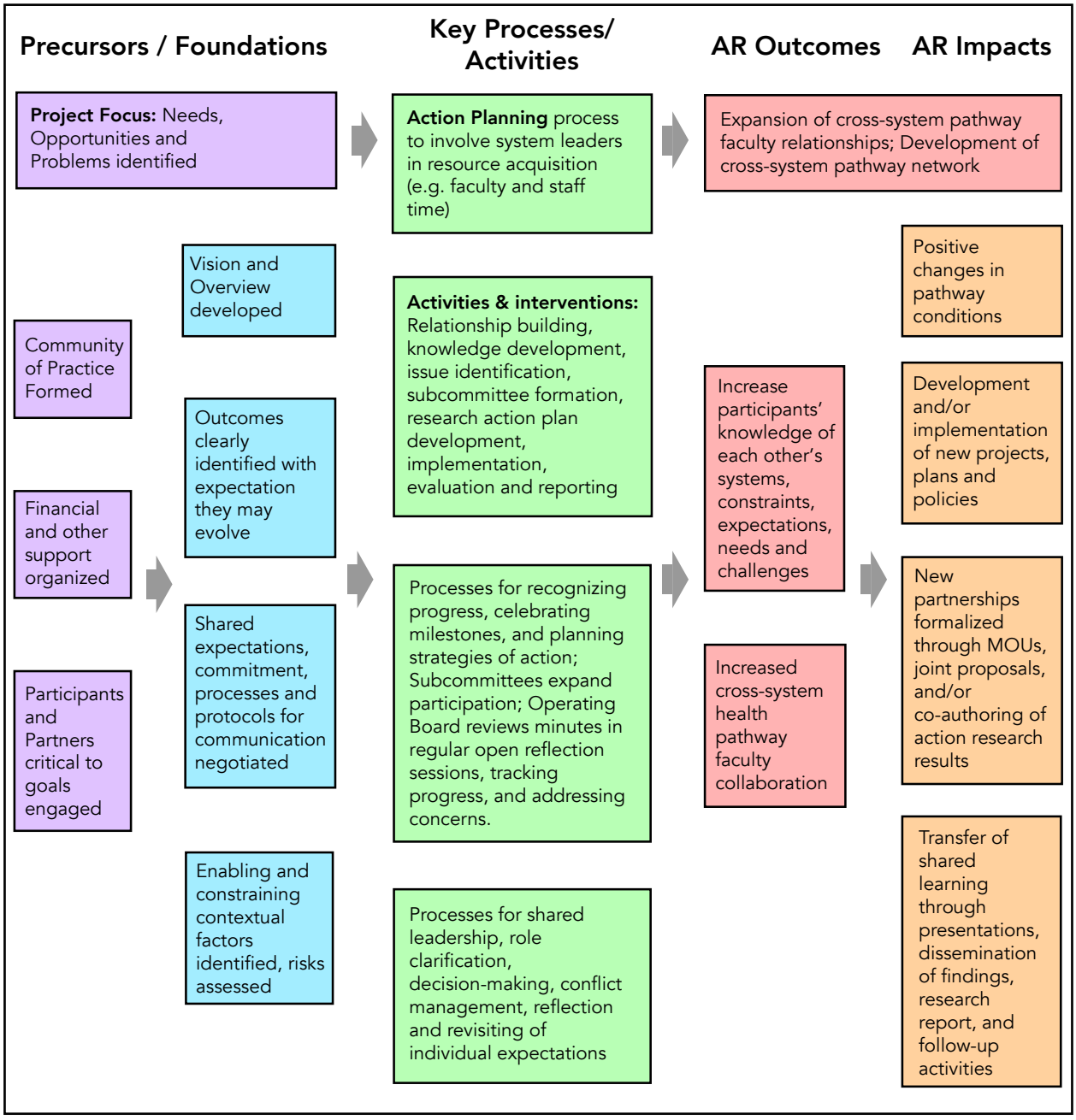
> Each cycle begins with a diagnosis of a specific problem, explicit goals, and a plan of improvement steps that are subsequently implemented. ...The purpose is …to learn how to change systems so that routine processes lead to better results. (Mintrop, 2016).

As this effort focused on engaging practitioners in a grounded inquiry process to determine strategic improvement steps each system could take, and to pilot those, specific improvement steps could not be planned in advance. The research design therefore incorporated participatory action research. Action research is "a collaborative transformative approach with joint focus on rigorous data collection, knowledge generation, reflection and distinctive action/change elements that pursue practical solutions" (Piggot-Irvine, Rowe, & Ferkins, 2015).

Participatory action research, or PAR, is action research in which "professional social researchers operate as full collaborators with members of organizations in studying and transforming those organizations" (Greenwood, Whyte, & Harkavy, 1993). PAR is well suited to addressing problems of practice within an educational organization, and is often embedded in a design development approach (Mintrop, 2016). In education contexts, PAR most often grows out of educators' practice, as they collaborate to address critical problems in their work, using evidence and data-based decision-making to evaluate and change programs through a logic process that builds

in careful reflection before action planning (James, Milenkiewicz, & Bucknam, 2007). The logic model for this study (Figure 1) was based on Piggot-Irvine and her colleagues' (2015) multi-site analysis of action research efforts to develop appropriate assessment measures beyond project implementation and participant satisfaction. This logic model defined pre-requisite conditions that the Leadership Team put into place, key processes and activities that the CoP utilized, and the expected outcomes and eventual impacts of the work.

Figure 1: Logic Model



The Action Research Cycle of Inquiry (Figure 2) provided a structure for the investigative process reiterated each semester. Using this framework, practitioners were able to prioritize goals, identify potential approaches that could impact the problem, take actions and collect data, then reflect and analyze before reporting and determining next steps. A structured reflection process supported the practitioner-researchers to make meaning of the data and its implications for their practice. This approach is designed to build capacity within organizations to engage in a continuous, evidence-based, reflective improvement process (Burns, 2007; Douglas Huffman & Kalnin, 2003).

Figure 2: Action Research Cycle of Inquiry

Participation

In design-based research, "the participants are cross-role teams, ideally representing all relevant actors from various layers of the hierarchy related to the problem at hand" (Mintrop, 2016). This CoP included system leaders, faculty, counselors, coaches, and a participant researcher. CoP's also involve various levels of participation, from core group, to active, occasional and peripheral participants (Wenger-Trayner & Wenger-Trayner, 2011), and this CoP was no exception. Participants in the pre-existing CoP represented only two high schools and one college, so recruitment focused on ensuring more regional representation from both systems, as well as representation from staff responsible for work affecting student transitions, such as articulation. Four distinct groups participated in the CoP: 1) high school and community college pathway faculty and staff; 2) high school and community college district and regional leadership, who primarily participated in end-of-cycle reporting and planning; 3) staff focused on supporting pathways to align across systems, who participated in both the day-to-day work of the CoP and in the Leadership Team; and 4) occasional participants supporting aspects of the work, such as the Summer Institute (see Table One).

The core group was defined by participation in semi-monthly reflection meetings, which identified action issues that grew out of the previous meeting, and set agendas for upcoming meetings. Core CoP members included college and high school faculty and staff focused on supporting pathways to align across systems. Many high school leads in the region remained peripheral to the CoP, tracking its work by following the minutes posted after each meeting, and sending teachers to the professional development opportunities promoted by the CoP, such as the Summer Institutes. Five community college faculty were active in the core group during year one, from two colleges in the Los Rios Community College District, including an articulation coordinator. In year two, two of those core members became occasional participants, a faculty leader joined as an active participant from a third college in the district, and faculty from one college included three new core group participants.

The Leadership Team of college deans, secondary district and site administrators, and staff focused on supporting pathways to align across systems provided input on goals and

objectives at the beginning of each year, and joined at the end of each semester to cull lessons from and engage with the CoP. Two foundation representatives invested in the work also joined occasionally. In year two, experts were called in upon occasion, such as when addressing data collection options in development for tracking students from high school pathways into college pathways. As a collaborating participant the researcher provided technical assistance alongside research responsibilities (such as documenting, facilitating reflection, organizing opportunities for public sharing of lessons learned, and drafting reports on the research).

Table 1: CoP Participants

Leadership Team	Core and Active CoP Participants	Occasional Participants
Secondary Leaders District pathway leaders, CCPT regional consortia leaders	**High school faculty (lead teachers, CTE teachers, one small school principal)** Year One: 4 high schools Year Two: 6 high schools	**Philanthropic Partner**
College Leaders Department Chair, Dean, health program leads, Foundation for California Community Colleges Workforce Development	**College Faculty (Health Program Leaders, articulation officer, Basic Skills)** Year One: 2 colleges Year Two: 3 colleges	**University medical school**
System Alighment Staff: Deputy Sector Navigator (DSN), health pathway coaches from two regional CCPT consortia, college articulation officer, university-based researcher & technical assistance provider	**System Alighment Staff:** Deputy Sector Navigator (DSN), health pathway coaches from two regional CCPT consortia, college articulation officer, university-based researcher & technical assistance provider	**Health industry partners**

Data Collection

Three types of data were collected: process data, impact data, and inquiry data. The process of establishing a CoP was documented with minutes, as were the reflective meetings in which CoP meetings were reviewed. Reflective meetings were the main format for the CoP to analyze its own process, as notes from these meetings were used to identify concerns, adjust the process, and plan future agendas. The second type of data collected assessed the impact of the CoP's work relative to the intended outcomes defined in the logic model, such as the number of formal articulation agreements developed due to the CoP. Collecting, reporting and analyzing inquiry data on the nature of the problem of practice, and on the feasibility of potential approaches comprised the main substance of the CoP's work to determine high priority systemic changes required to impact student transitions from secondary into postsecondary health pathways. This working data was made accessible to all CoP members in a common Google folder, which also included goals, minutes, and reports.

In order to support the development of other sector-specific CoPs aligning secondary and postsecondary systems, this paper focuses on the processes involved in the first two iterations of the Cycle of Inquiry described in Figure 2, with summary data on the intervening Summer Institutes, and the second year of the CoP's work.

Process

Summer Institute 2015

The main avenue for expanding the CoP among high school health pathways was a Summer Institute, organized under the leadership of the region's deputy sector navigator in health, and supported by pathway coaches from the CCPT-funded cross-district consortia as well as the University-based researcher. The Summer Institute introduced high school health pathway faculty to the broad range of health careers and health pathway postsecondary programs available in the region, with the goal of infusing allied health career information into those pathways (See Figure 3).

Figure 3: Summer Institute Objectives

Summer Institute Objectives

- Understand effective practices that improve readiness and access of high school students to postsecondary allied health educational programs and careers.
- Describe the post-secondary educational pathways for pre-med and allied health professions and resources, assessments and enrollment process for healthcare programs within the California Community College system.
- Develop a lesson plan that integrates effective transition practices, healthcare industry content standards, and work-readiness skills.
- Be introduced to a community of practice with health pathway colleagues from both k-12 and community college systems.
- Increase teacher access to resources and knowledge about strategies for improving students success in health pathways, k-12 through postsecondary.

Teachers from eight high school health pathway programs in the region participated in a week-long combination of presentations and site visits. Pathway general education and CTE teachers received college credit and a moderate stipend to engage with industry partners who introduced them to the wide range of allied health careers, and the critical foundational skills needed for success in those careers. Teachers met with post secondary participants from seven community colleges, a CSU and a UC, and took part in site visits to both college programs and health service providers. The institute culminated in presentations by the teachers to each other demonstrating how they were going to integrate what they had learned into their curriculum.

Teachers then discussed desirable objectives for ongoing work, and were invited to join the newly forming CoP. Their objectives for ongoing collaboration included:

1. Developing curriculum, activities, and alignment in the industry field
2. Making connections and learning about Allied Health careers
3. Accessing resources for college and career readiness work with students, such as speakers and site visits
4. Identifying best practices for preparing students to meet college and career expectations
5. Building capacity to influence change in their own contexts

At the end of the summer, the Leadership Team met to ensure that the key prerequisite conditions were in place, including financial and other support that could facilitate faculty participation. The Leadership Team reviewed the teachers' objectives developed at the end of the Summer Institute, and drafted both a vision statement and a set of goals for the CoP to consider. Given the gulf between the two education systems, they prioritized building cross-system relationships, and learning about each other's pathway programs of study (see Figure 4).

Figure 4: Initial Goals Defined by Leadership Team

Build Relationships
• Introduce programs • Observe effective practices • Study research-based instructional strategies
Develop cross-system understanding of each other's pathway programs
• Mapping PoS • Common framework for K12-CC CTE • Coordinate with regional work • Include counselors and administrators
Develop curriculum alignment processes
• Common foundation content standards • Professional behaviors • Developmentally appropriate curriculum
Deepen knowledge of each other's systems
• Common Core, NGSS, high school pathway approaches • CTE certification and licensure requirements • Student Support and Success Initiative • Articulation/Dual Enrollment • Transfer Processes and transfer model curriculum
Involve industry partners
• Identify foundational standards and develop applied curriculum
Develop cross-system action plans for improving transitions

Phase One: September – December 2015

Prioritize goals and objectives

The CoP launched with faculty from two community colleges in one district, and from four high schools representing three different districts. The goals (Figure 4) and a vision statement (below) were reviewed and adopted by the CoP at the first meeting:

> This collaborative 9-14+ Community of practice will engage health pathway faculty and staff in learning about each other's systems, and best

> instructional practices as part of aligning curriculum and courses to facilitate successful student transitions into health careers. (Minutes, September 29, 2015)

An initial discussion reviewed the goals and structures planned for the CoP. Some of the key processes defined in the logic model (see Figure 1) were discussed and agreed to as working norms of the CoP, including how often to meet, how to structure meetings and reflections, and how to make decisions and ensure that all voices were heard. While an "Operations Board" representing both K-12 and post-secondary participants took on day-to-day leadership, a regular time to reflect upon meeting minutes was established after the first meeting and opened up to all participants to ensure transparency and access broad participation in leadership and decision-making.

Faculty began with an initial exchange of ideas on a wide range of health pathway concerns and possible strategies, including dual enrollment, student placement and multiple measures, pathway mapping, and the challenge of finding internship or practicum placements for students. Faculty brainstormed promising approaches, many of which:

> Use public health community-involved service learning projects to provide access to health professionals in a real world context, integration with classroom curriculum, and training in essential foundation skills, like cultural competencies, sociology, and public health issues (Minutes, October 13, 2015).

Plan actions:

By the third meeting, an action plan was approved, to systematically introduce each of the participants' programs of study and key concerns. Time was devoted to in-depth discussion of each program in the CoP, exploring commonalities, differences, and areas of potential collaboration. The Allied Health Learning Community at Sacramento City College opened the introductions, which grounded the CoP in an understanding of the bridging efforts that had preceded this iteration of the CoP. In the course of each introduction, information about each of the systems was conveyed. For example:

> If students are in the Allied Health Learning Community, they get 2 years of guaranteed enrollment in prerequisite classes. … Sacramento City College has decided to go ahead with the Community Health Worker certificate program and will work with feeder schools to develop it. It will be an Allied Health / Community Studies interdisciplinary program, emphasizing Public Health and Social Work elements of the pathway as opposed to patient care in a direct setting. (Minutes, November 10, 2015)

Each introduction opened up discussion of different system-specific constraints, such as course and program approval processes and secondary teacher credentialing versus community college minimum qualifications. By stopping to examine each unfamiliar aspect of a particular system, a common foundational understanding of a cross-system health pathway began to grow — a pathway fraught with barriers to students' successful transitions. Such discussions about program structures and the barriers that faculty were experiencing led to exploration of

the contextual conditions that differentiate the secondary and community college systems, and to a common sense of purpose in facilitating student transitions with the pathway. The action plan in the first phase tackled the goals of relationship building and getting to know each other's systems (See Figure 5).

Figure 5: Phase One Cycle of Inquiry

Gather data:

Participants collected information on concepts and processes faculty needed to understand each other's programs, such as dual enrollment and articulation, as well as information on other system-specific concerns. They learned about the acronyms, norms and the structures of each other's institutions. They were introduced to each others' working conditions and program requirements, such as Certification Board requirements, the Student Support and Success Act, the range of high school pathways, and CTE and Common Core Standards. Learning about the characteristics of the two systems that impact pathway development and alignment led faculty to identify opportunities for resource sharing and collaborating to strengthen curricular connections.

Reflect and analyze:

During the first semester, reflections were facilitated by the college faculty member on the Operating Board, using minutes taken during the meetings by the researcher-participant. Minutes were shared with all participants, reviewed one week after each meeting of the CoP, and drove the agenda of the twice-monthly CoP meetings.

In these open reflective meetings, participants reviewing the minutes addressed three questions:

- What worked well, and what learning resulted?
- Where did we struggle and why?
- What are the implications for our future work?

This reflective process resulted in collaborative and participatory decision-making to adjust goals, agendas, and overall directions.

Report and assess:

At the end of the fall semester, CoP participants reported to the Leadership Team in a joint meeting. In describing what they had learned through that first semester, participants affirmed the importance of developing relationships as a key initial priority:

> Seeing the support and the bigger picture has provided crucial motivation for pathway leaders; without the group's support, they would likely not persevere (Minutes, December 8, 2015).

They expressed empathy for each other's challenges and commitment to a process that could affect changes:

> The level of duress that so many pathways are developing under, and the dedication of the instructors, is so very impressive. But it is also so important to figure out how to change the conditions or else we will lose those leaders (Minutes, December 8, 2015).

The college faculty member who facilitated the CoP during the fall semester presented the key issues raised in discussions during the fall aligned to the CoP's goals. The group discussion then elicited recommendations for next steps:

> Sacramento City College has an Allied Health Learning Community that teaches the introductory courses/pre-requisites to get students into those programs sooner using a Summer Bridge. The CoP should jointly develop agreements with health pathways around what should be completed to insure student access to a Bridge Program. Those agreements should also incorporate contextualized English and math, and the courses piloted as dual enrollment courses at Health Professions High School, Anatomy & Physiology and Medical Terminology as well as Medical Language and Intro to Health. (Minutes, December 8, 2015)

Three focal areas of work were identified: Pathways, Systems, and Transitions, and subcommittees aligned to each of these areas were developed for the spring semester.

Phase Two: January – June, 2016

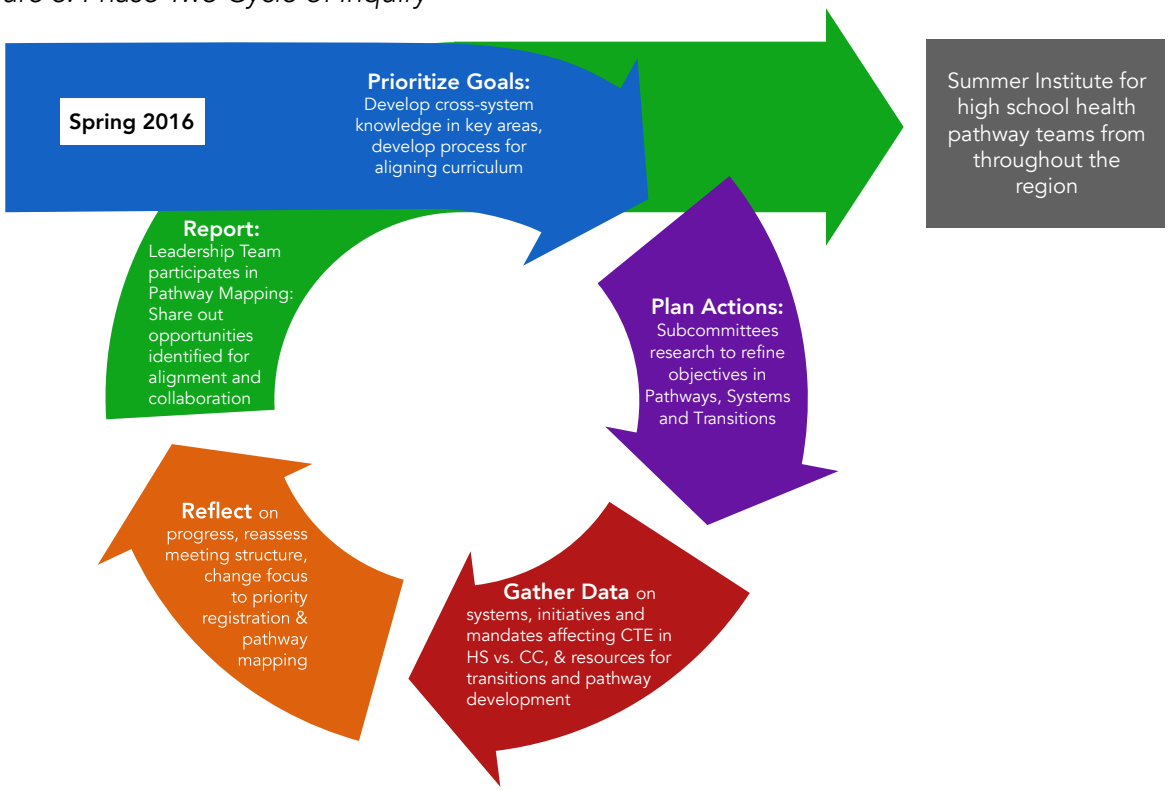
Prioritize goals and objectives

The second cycle began with a review of the logic model, connecting the process with expected outcomes before breaking into the three subcommittees to establish goals. The Pathways subcommittee's goal was to provide a foundation from which the CoP could identify core standards, both skills and content, upon which to focus alignment efforts. The Systems subcommittee intended to identify strategic articulation and dual enrollment efforts in order to support student success and facilitate smooth transitions to college. The Transitions subcomittee set a goal to open up the "black box" of the two-year gap between high school graduation and entrance into most allied health pathway programs, to better understand the obstacles to successful pathway transitions, in order to develop strategic interventions.

Plan actions:

The Pathway subcommittee prioritized pathway mapping, using templates from Career Ladders Project and ConnectEd, in line with the national CTE model for mapping programs of study. The Systems subcommittee prioritized the development of a common framework for understanding how CTE standards in K-12 relate to the skills and content required of students in postsecondary health pathways. The Transitions subcommittee prioritized research into the key obstacles facing students who transitioned from high school to postsecondary health pathways, as well as best practices for addressing them.

Figure 6: Phase Two Cycle of Inquiry



Gather data:

The Pathways subcommittee investigated pathway mapping as well as college district strategic planning regarding pathway development. The Systems subcommittee researched priority enrollment options and restrictions, as well as curriculum alignment strategies, and the Transitions subcommittee surveyed students and researched the literature on the two-year gap. Participants met alternately in person and online in subcommittees for six weeks, with the expectation that online subcommittees would expand participation and productivity. Templates were created to establish norms for documentation and an online Google Drive folder made resources and minutes accessible.

Reflect and analyze:

By March, reflection on the CoP's process determined that participants felt less connected with online meetings, and that they were not effective for expanding participation. Participants noted:

> Three subcommittees may be too much. We need greater group clarity about what the specific work is. The nature of the work has changed. Last semester the knowledge was in the room. This semester, finding good models requires initiative and creative work to make up things that don't exist. That is hard to do in the midst of recruitment and scheduling for next year. It is falling through the gaps. This is higher level work for which we need a plan. (CoP Minutes, March 1, 2017, p. 1)

The CoP revisited what each of the participants wanted out of the work, searching for a way to "narrow the goals to focus around something concrete and product oriented that can be useful" (ibid, p. 2). They concluded that pathway mapping would allow them to develop an overview of the content, skills and courses currently in existence in the pathway, in order to affect student readiness, time to degree, career knowledge and program development. Subcommittees continued to meet during in-person CoP meetings, collecting and reporting data around each of the three priority areas, but a pathway mapping exercise became the targeted outcome for the semester.

Discussion of data brought back to the CoP explored system-specific vocabulary and content, such as the different course coding systems, CDE-recommended course sequences, Title 5 open access requirements, and postsecondary certification requirements. In reflecting on the data reported on priority access, the CoP realized that priority enrollment was not a viable option for two reasons. First, most health pathway programs cannot be accessed until students have completed prerequisite and general education requirements. Second, most health pathway programs appear to be "impacted," with significantly more applicants than seats, and therefore students are routinely selected through a random access process, mandated by Title 5 regulations.

The CoP began developing an action plan for obtaining priority access to registration, instead of enrollment, for graduating high school health pathway students. The transitions subcommittee reported that a major obstacle to student success in health pathways was access to impacted prerequisites, which priority in registration could improve. That plan included

developing a portfolio of early college courses and experiences, certifying pathways that articulated or dual enrolled those college courses, and educating school boards and senate faculty regarding the quality of health pathway programs.

With the support of ConnectEd and Career Ladders Project, the pathway subcommittee planned a three hour "rapid mapping" session, conducted at the end of March. The CoP reviewed pathway maps and the purpose, limitations, and potential outcomes of a pathway mapping process to determine goals for pathway mapping:

1. Develop a map of all programs, including prerequisites to get in, requirements to advance, and requirements to advance to clinical. Also map general education courses that double as program requirements.
2. Identify general education requirements that could be contextualized, such as Nutrition, and English 300.
3. Explore ways to both articulate and contextualize math, such as the Emergency Medical Responder course, which would provide an industry certificate.
4. Identify courses that could be articulated or dual enrolled for high school programs of study, and that could add industry certificates.
5. Identify "hinge" courses that provide foundational skills, meet pre-requisites for a wide range of postsecondary health pathways, and could be embedded in the senior year.

Through these discussions, CoP faculty learned about the characteristics and relative merits of dual enrollment and articulation, A-G status, the GPA bump for honors credit, "hinge" courses and course sequencing for high school health pathways.

The rapid pathway mapping process included the Leadership Team. After an overview of intended outcomes, each health pathway program of study was presented. Faculty broke into subgroups for discussions across high school and college programs to align programs of study. Viewing the programs together, as one pathway, they explored the strengths, gaps, and opportunities for strengthening students' success in the pathway. This process resulted in identification of key opportunities for collaborative work, which were prioritized at a subsequent meeting. Courses for articulation or dual enrollment were highlighted, as well as other collaborative opportunities to link pathways, such as coordination of Dental Assisting Program service learning with high school health pathways.

As the CoP next began to discuss the portfolio of courses and experiences that would represent a high quality pathway program of study, they shared critical information about the contexts in which they were working. The following excerpt from the minutes exemplifies these discussions:

> From the community college comes a concern about when students take the courses: Do you want to make sure they are taking it in the semester prior to transfer? Community colleges worry about skill and knowledge degradation in the time between course taking and the college level course. High school faculty explained that there is not room in the

schedule for students to do more than one or two (rarely) CTE courses per year, and noted that in the senior year there is already the expectation of a senior internship course. Community colleges are concerned about recency, but high schools argue that if content is offered earlier, in 10th or 11th grade, and built upon with consistent use in aligned courses and internships, it provides a more solid foundation (Minutes, April 26, 2016).

Such discussions also raised the serious obstacles to articulation and dual enrollment CoP members experienced. One college, someone commented, "hates articulation," and "courses don't count as units until they enter the campus." Another college refused to allow students under 16 to receive credit in articulated courses. The CoP was aware that dual enrollment options were changing, but little was yet understood about the new pathway-specific version recently authorized by AB288. CoP members expressed some frustration at the end of the semester. They wanted to ask the Leadership Team: "Are you ready to push dual enrollment forward, support the demand for priority registration for pathway students, and help take down the barriers?" If so, "Get agreements processed." (CoP Minutes, April 26, 2016)

"Community colleges are concerned about recency, but high schools argue that if content is offered earlier, in 10th or 11th grade, and built upon with consistent use in aligned courses and internships, it provides a more solid foundation."

Report and assess:

The pathway mapping activity served as a combination workshop to summarize issues and progress for CoP members and the Leadership Team. It was followed in April by a broader report on the work of the CoP to a regional "Collective Impact" group representing institutions committed to developing college and career pathways throughout the Capital Region, including most of the Leadership Team. This larger regional grouping endorsed the work of the health pathway CoP, and decided to duplicate the CoP approach to pathway development and systems alignment in the Information and Communication Technology (ICT) sector.

Summer Institute 2016

For a second summer, 27 teachers from 16 high schools in the region participated in the week-long health pathway Summer Institute. They were introduced to a wide range of industry partners and jobs, as well as to the skills that need to be emphasized with students entering health fields, the related postsecondary programs available in the region, and the role of the CoP in facilitating secondary and postsecondary collaboration. Teachers earned two units of college credit for 36 hours of class time. All Summer Institute participants were invited to share their curriculum units, and to join the CoP in the fall, which some did. CoP leaders also enrolled twenty-four teachers who completed the summer institute in either 2015 or 2016 to participate in externships of between 15 and 40 hours at various health industry sites.

Phase 3: August 2016 – July 2017

These cycles of goal setting, action planning, data collection, reflection and reporting continued through the second year of the CoP. In August, the Leadership Team proposed objectives for the 2016-17 year. The CoP revised and reordered them, choosing to focus on the last goal, "Develop cross-system action plans for improving student transitions & initiate efforts." Other goals, they determined, would be addressed through tackling this one. They also revised and prioritized the objectives for the 2016-2017 year:

- Refine proposal to pursue at the College District level to assign pathway students who have completed a portfolio of college-level and pathway-preparatory courses "continuing student status"
- Identify other ways to impact the two-year gap and obstacles to student transitions: impacted programs, singular high stakes test-based placement, and the common pattern of students getting stuck in years of developmental education courses.
- Develop ways to improve equitable access to health pathways.

The CoP grew to involve more community college and high school faculty, adding a college and two high schools, and expanding the roles represented to include counselors and non-pathway college faculty associated with the Basic Skills Initiative.

Over the summer, the handbook for AB288 Dual Enrollment had been produced, inspiring CoP members to research new dual enrollment options afforded by recent legislation (AB288).[1] It became evident that another avenue for priority access to registration had opened up. If the high school and college districts in the CoP could develop the required College and Career Access Pathways (CCAP) agreements, students in pathways that embed a dual enrollment "hinge" course during the second semester of the senior year could be considered continuing students with priority for registration in the fall.

The CoP then investigated the idea of "hinge" courses, which could be adopted by the majority of college and high school health pathways in the region to provide foundational content and skills that prepare high school students for a wide range of postsecondary options within the field. If a faculty-approved CCAP dual enrollment hinge course could be embedded in the second semester of the senior year, pathway students would be considered continuing students, and would automatically have priority in registration. This would improve their access to the oversubscribed prerequisites needed to become eligible for postsecondary health pathways. In addition, the more units of credit students earned in high school, the higher their priority registration status.

[1] AB 288 instituted CCAP Dual Enrollment, intended to support pathway students, many of whom might not otherwise access college classes in high school. CCAP Dual Enrollment classes can be embedded into the regular high school day, meet a-g college entrance requirements, provide additional supports for students to be able to accelerate learning, and be taught by either high school or college faculty who meet college minimum qualifications.

At the end of the 2016 fall semester, the CoP was able to present recommendations to the Leadership Team for all three priority objectives (see Table 2). Work in the spring of 2017 focused on the feasibility and rationale for offering three 12th grade dual enrollment courses:

1. Introduction to Anatomy and Physiology,
2. a health care-focused college skills course
3. Health Care in a Multi-Cultural Society.

Table 2: Health Pathway CoP Objectives and Reccomendations Fall 2016

Priority Objectives	Recommendations
• Refine proposal to pursue at the College District level to assign pathway students who have completed a portfolio of college-level and pathway-preparatory courses "continuing student status."	• Infuse dual enrollment courses into high school health pathways that would support transition to college health pathways, including providing students access to a foundational dual enrollment course during the spring semester senior year that would make them eligible for "continuing student status" when registering for their first semester classes.
• Identify other ways to impact the two-year gap and obstacles to student transitions: Impacted programs, singular high stakes test-based placement, and the common pattern of students getting stuck in years of developmental education courses.	• Create a guide that provides helpful health pathway planning information, such as certification info on CAN, Home Health Aid, Community Health Worker; Include info on industry recognized certifications, job market, impacted and non-impacted programs, advice and data about course options to accomplish graduation requirements. • As pathways are developed and pathway maps are synthesized, link them to the online version of the guide. • Expand use of Hi-Touch Healthcare: Critical 6 Skills for Healthcare Professional and the related curriculum units. • Consider systematic support for faculty-sponsored student associations to connect and support health pathway faculty & students across secondary and postsecondary.
• Develop ways to improve equitable access to health pathways.	• Connect to basic skills initiative at City College. Invite faculty from SCC, CRC, ARC to present to the CoP. • Look at how to infuse STEM assessment into high school pathway programs, and how faulty can use the data. • Offer contextualized math: Math 144 and Math 140 (which never gets offered). Math that Matters. • Include data about course options to accomplish graduation requirements in guide.
• Increase CoP member's knowledge of each other's systems/programs of study and the process for aligning the two systems.	• Synthesize mapping done last spring into a graphic map that can be used by counselors, faculty, students and families. Update as new early college credit courses develop. • Incorporate into the community of practice more faculty from high school and postsecondary schools in the region.

By the end of the Spring, the practicality of scaling up each of the three courses had been thoroughly vetted, and the proposal revised. K-12 faculty asserted that a single semester dual enrollment Bio 100 (Anatomy and Physiology) course would not prepare students as well as the typical year-long high school lab science course, and that higher performing students would

prefer to take AP Anatomy and Physiology. A dual enrollment counseling-based college skills course would be challenged to find instructors. Instead, a plan to create health-contextualized modules for CSU's college preparatory Expository Reading and Writing Course (ERWC) was initiated, which could build essential skills and help mitigate disparities in student placement. Health Care in a Multicultural Society was proposed as a pilot for CCAP Dual Enrollment, as a "hinge" course that could provide a strong foundation for any postsecondary health pathway, with a focus on cultural competencies and the social determinants of disease.

While working on those courses, the CoP also began exploring options for gathering data on CoP health pathway students, to provide a baseline from which to measure the effectiveness of system changes initiated through the CoP's work, and to identify key barriers to student success, in particular for underrepresented students. In that process, key issues with data collection were identified. For example, high school health pathway students entering community colleges are identified by their participation in at least two high school health pathway CTE courses reported in the CalPADS system. However, a tremendous number of high school health pathways cannot find CTE-credentialed health teachers, so their pathway courses do not get entered as CTE courses in CalPADS, and their students therefore do not show up in the data. Other issues included prerequisite courses for college health pathways not counting as pathway courses, resulting it the appearance of students leaving pathways when they were preparing to advance; and a total lack of data on the extent and effect of program impaction.

The July Summer Institute involved faculty from eight health pathways.

Discussion of Findings

Process Findings

The participatory action research approach developed in this CoP promoted expansion of cross-system pathway faculty relationships, and the development of a cross-system pathway network; increased participants' knowledge of each other' systems, constraints, expectations, needs and challenges; and increased health pathway faculty collaboration around their shared vision and goals (see Logic Model, Figure 1). This understanding of each other's systems was found to be a critical factor in aligning pathway programs of study and facilitating student transitions.

Wes Muller, lead teacher at Oakmont High School's Health Careers Academy, emphasized this in presenting findings at a statewide conference: "Developing relationships and learning about each other's programs is the essential foundation for improving linkages and student success" (Linked Learning Convention Presentation, Tuesday, January 24, 2017).

Participants emphasized the importance of developing relationships in order to gain a deeper understanding of the contextual differences between high school and community college systems. An essential outcome of the process the CoP engaged was a clearer understanding of the two contexts that participants sought to align, and the implications of those differences for the collaborative work of supporting students to successfully transition into health careers. Table 3 describes some of the key differences that surfaced between the two contexts.

Table 3: Comparison of High School and Community College Pathway Contexts

High School Teaching Context	Community College Faculty Context
• High school pathway teacher teams have the particular task of shepherding a cohort of students through adolescence, as they prepare for postsecondary education and careers.	• Community colleges teach a wide range of students who are not necessarily coming out of California high schools. Nationally, the average age of a community college student is 29, 2/3 are part-time, and many leave and return multiple times.
• Pathway faculty work collaboratively across disciplines to provide broad foundational skills for students expected to continue their education, who may or may not enter the career field, or a related career field.	• Pathway faculty must develop a program of study that leads to employment, certificates, degrees or transfer to further education in a specific career field.
• The high school workday is regimented, with many hours of uncompensated time built into the teacher workload.	• 44% of all community college classes in California are taught by part-time faculty, many working at several colleges or in the industry while teaching.
• High school faculty preparation requirements are overseen by the California Commission on Teacher Credentialing, with significant differences between CTE and single subject credentials.	• Community college faculty do not have preparation requirements, rather they have to meet minimum educational and experience qualifications, which differ by discipline and CTE sector.
• Departments have been the organizing structure for comprehensive high schools, and interdisciplinary pathway teams often compete for professional development time with departments, already engaged in Common Core implementation.	• Community college faculty connecting to high schools are primarily engaged in aligning with each other and with four-year colleges, and in improving student supports
• Subject department chairs have historically participated in site leadership, but pathways have mostly been small, marginal programs, and may not be included in decision-making.	• Community college tenure-track faculty's participation in the faculty senate and other working committees are incorporated into their job descriptions, and leadership is elected and compensated through release time.

Impact Findings

Progress was made in many areas of the Leadership Team's first objective, to identify systems changes needed to align K-12 and community college pathways:

- CoP members' research and requests for attention from leaders to articulation and dual enrollment processes spotlighted a strategic target for systems change efforts, spurring the drafting of a pilot CCAP agreement.
- The pathway maps generated new work on counseling practices, alignment of program prerequisites, and identification of key courses for contextualization and student supports.
- Discussion of pathway maps provided impetus to initiate mapping at another college.
- Pathway maps are now being uploaded into an online user-friendly interactive format by the Community College Chancellor's Office.
- New inter-segmental faculty collaborations have developed: college health pathway students demonstrate performance tasks such as emergency response using simulation equipment, or dental cleaning techniques, to provide college and career education to high school health pathway students.
- The deputy sector navigator was able to direct resources to support key systems changes, such as funding college faculty release time to serve as pathway champions, as well as expansion of college programs where institutional capacity and workforce demand are strong.
- Other systemic change efforts have moved in synergistic parallel, for example regional ERWC trainings included health pathway English teachers, who are now preparing to develop contextualized ERWC health modules.

Although the draft CCAP agreement is still in negotiation, the Leadership Team's second objective, to expand pathway curricular alignment and early college coursework, saw significant progress:

- Pathway mapping highlighted many opportunities for alignment, and has sparked similar health pathway alignment efforts within the region.
- Medical Dosages and Pre-hospital Calculations were articulated to contextualize academic content in high school health pathway courses such as chemistry and math.
- CoP high school and college faculty began working to create contextualized modules of a rigorous English course designed to prepare students for college ERWC.
- Emergency Medical Response and Dental Hygiene 100: Introduction to Dental Hygiene were also articulated as a result of the CoP's work.
- The first effort in the region to craft an AB288 CCAP agreement for pathway-specific dual enrollment between the Los Rios Community College District and two large districts in the region is in the process of being negotiated
- A "hinge" course was proposed to pilot the CCAP agreement, and an action plan initiated to train high school faculty with the support of a faculty champion using articulation in the first year while that CCAP agreement is being finalized.

The third objective, improving transitions and success particularly for students who are under-represented in the health workforce, has made initial progress:

- Development of pathway maps for use in counseling
- Development of courses that support essential skills for success in health pathways in Data collection initiated to track student success in gatekeeper prerequisites for health pathways
- Initial alignment, articulation, and linkages built with programs serving largest numbers of under-represented students

Conducting a PAR project through a CoP within the health sector elicited two types of lessons: about how to effectively align programs of study within an industry sector, and about the specific challenges of aligning health pathways across secondary and postsecondary systems. Systems alignment within any industry sector requires attention to building relationships across systems. If faculty and staff are to change how they work and to collaborate across systems, they need to identify with faculty and students in the other system, and gain familiarity with the structures that set constraints and opportunities specific to each system. Because aligning programs of study across very different systems entails significant changes in each system, system leaders need structures to ensure regular communication and accountability to inform their work leading systems change. Their priorities for change are also informed by the specific constraints and opportunities that operate within a given industry sector, region and community, which the CoP can help to examine.

Relationships and Knowledge Building

The health pathway CoP was initiated as an incubator for systems alignment with a theoretical assertion that establishing relationships and learning about each others' systems, cultures, and constraints while looking for common ground would allow participants to develop a sense of belonging to a K-14+ pathway, and would increase their investment in and capacity to forge links between systems.

CoP members, a year and a half later, presented lessons learned from their work with the CoP at a Linked Learning Alliance Conference in Oakland:

- Solutions will not be one-size-fits-all. Each high school/college pathway connection will need to adapt solutions to fit their context. Best practice may be to create a range of options that address different needs.
- Developing relationships and learning about each other's programs is the essential foundation for improving linkages and student success.
- It is strategic to build on current practices while using new opportunities and resources to make changes in systems: rather than seeking priority enrollment for high school health pathway students, the CoP decided to seek continuing student status through the careful design of health pathway programs of study and the new AB288 opportunities.

- A health pathway faculty community of practice thrives on regular face to face conversation, which is limited by geographic and time constraints. Sub-regional work or smaller task groups may be needed to expand secondary – postsecondary collaboration in meaningful ways.
- Participants come to the CoP because they are passionate about what we can learn from each other and do together to align health pathways for student success.
- Many of the challenges health pathways face cross segmental lines, such as finding qualified faculty, and accessing industry placements for students. Cross segmental collaboration creates opportunities that surpass the sum of what we can do in our segments. (Slide Presentation, Linked Learning Convention, January 24, 2017)

Overwhelmingly, the lessons core members shared emphasized the importance of those relationships which allowed them to better understand the barriers students were encountering, and to problem solve with the combined resources and perspectives of faculty from both institutions. Those relationships were difficult to build and maintain beyond a certain geographic distance, which limited the extent to which the CoP could serve the greater Capital region. Nevertheless, the influence of the CoP on secondary-postsecondary relationships was felt throughout the region both through online distribution of all minutes to all interested health pathways in the region, and in the Summer Institutes, where high school faculty were introduced to and provided time to discuss programs of study with faculty at the colleges closest to their programs.

Acknowledging the differences between the two systems was as important a part of building those relationships as identifying common problems to address. In defining how the pathway context differed from the secondary to the postsecondary level, faculty became familiar with each other's constraints and challenges, as well as their strengths and accomplishments. This was an essential first step in understanding the terrain, which preceded problem solving (see Table 3 on page 26).

Role of the Leadership Team

While health sector-specific challenges created difficulties in recruiting many health pathway faculty, the possibility of supported collaboration across systems to improve student success was also attractive. Through the CoP, faculty could tackle systemic problems they could not take on individually. More than a way to improve their individual programs, the CoP offered the possibility of changing the context in which so many of their students were so poorly served.

Because the CoP was supported by and accountable to a Leadership Team from both of the secondary and postsecondary institutions involved, the learning generated there had the possibility of impacting decisions about resources and priorities beyond those of its members. Leadership Team members participated in defining the issues, some associated themselves with subcommittees, and all communicated their investment in the work of the CoP. Connecting with the Leadership Team at the end of the semester-long inquiry cycle maintained the community's relationship with the Leadership Team.

At each final celebration of progress, participants shared lessons learned, obstacles, and areas in which support was needed. Those culminating sessions provided an avenue for educating key leadership from both systems on the work of the CoP and informing them of needed systemic changes to facilitate the goals of the CoP. This provided an essential foundation for ongoing support and access to resources. Many of the changes the CoP sought to implement required leadership actions beyond the scope of the faculty and leaders meeting regularly in the CoP, such as secondary-postsecondary district agreements regarding CCAP dual enrollment. Regular reporting to, reflection and engagement with the Leadership Team allowed the CoP to explore options for collaborating across the two complex systems, generated innovative approaches for leaders to champion, and provided leaders with expert analyses to determine priorities.

"At each final celebration of progress, participants shared lessons learned, obstacles, and areas in which support was needed. Those culminating sessions provided an avenue for educating key leadership from both systems on the work of the CoP and informing them of needed systemic changes to facilitate the goals of the CoP."

Changing Institutional Structures to Align Pathways

The challenge of collaborating across these very different secondary and post-secondary systems was described by the community college faculty member who took on the role of CoP facilitator during the first semester, as "a bridge building process," in which the team was working from different sides of a river on two ends of a bridge that needs to be aligned in order for students cross over. Mapping programs of study aimed those pathways in each others' direction, but creating linkages required investigation and targeted actions. The CoP sent members to trainings, discussed resources, and collected data on institutional practices regarding articulation, dual enrollment for advanced coursework, and the pathway-specific version of dual enrollment recently authorized in California by AB288. Research on early college credit's impact on post-secondary outcomes was shared and discussed (Drew & Dadgar, 2012).

As our understandings of each others' programs got more complicated, mapping the programs of study helped to identify strategic opportunities for collaboration and improvements. Embedded articulations were developed to contextualize academic content, such as in chemistry. Other linkages were formed around the use of simulation equipment and college student skill demonstrations that provided career education for high school students. Articulation and dual enrollment policies were reviewed and questioned and slowly pushed to change. By the end of the first year of collaboration, that bridge metaphor had become a more detailed construction, with a range of different types of on-ramps, and with off-ramps to multiple destinations.

With regular input from the CoP, leaders in both systems worked to shift their institutional practices to facilitate systems alignment, revisiting procedures, allocating resources, assigning staff, and beginning to develop agreements. For example, pathway mapping had a powerful impact, both because it summarized much of the work done over the course of the first year; clarifying each program's vision for secondary - postsecondary alignment, and because it produced changes that affected student learning. As one core member of the CoP noted regarding the Pathway Mapping session:

"The bottleneck in community college health pathway programs was a recurring and frustrating conversation with serious implications for the CoP's work."

> The work that HPHS and ARC did with articulation agreements coming out of that Spring 2016 mapping process -- those articulation agreements for PMED 105 and PMED 108 would have NEVER come to fruition if we hadn't done that incredibly powerful mapping session! (Marla Clayton Johnson, HPHS Principal, Assessment of Outcomes, April 6, 2016)

System-level leaders assigned staff to develop those initial pathway maps into resources for counseling students as well as into interactive online maps describing pathway course sequences. Faculty began using them to discuss aligning prerequisites between programs, and other colleges in the CoP decided to engage in a similar pathway mapping process.

Health Pathway Sector-Specific Challenges to Systems Alignment

The CoP sought to align systems in a sector that poses particular challenges to improving students' successful transitions and linking curriculum across segments. The impacted nature of postsecondary health pathway prerequisites and programs, the shortage of preceptors and placements for clinical experiences required for certification in health pathways, and the shortage of health pathway faculty have created a huge and self-reproducing bottleneck in the preparation of the health pathway workforce.

> On the one hand we need to get students coming out of high school with college-ready math and writing skills, to emphasize college readiness skills even more than college-level classes. On the other hand, even if students are fully ready with clearly defined pathways, they are still stuck by impaction. When programs are currently only admitting half the fully prepared students, making a clearer pathway only increases the number of students who don't get in. (CoP Minutes, March 21, 2017)

The bottleneck in community college health pathway programs was a recurring and frustrating conversation with serious implications for the CoP's work. To be eligible to apply to college-level health pathways, students must complete one to two years of prerequisite courses, many of which are severely impacted. Because the majority of high school students entering

community college place in remedial classes (Scott-Clayton, 2012), the time between graduating from high school and eligibility for health pathway programs is often extended. Even when students succeed in becoming fully eligible for health pathway programs, most programs have many more qualified applicants than they have seats, and are mandated to use a random access process to determine acceptances. These factors complicate efforts to facilitate student transitions from high school into college health pathways.

To investigate the two year gap, one CoP high school health pathway lead surveyed 15 of her former students, who reported great difficulties in transitioning to postsecondary health pathway programs, including difficulty getting into and passing prerequisites, financial aid challenges, and discouragement with remediation. Many who initially intended to continue in the health field never did so. These obstacles to student transitions increase disparities in the demographics of the health workforce, and impede faculty identification with a cross system, vertically aligned health pathway pipeline.

When faculty cannot look across the K12-postsecondary divide and see "their" students, it is difficult to envision themselves as part of a cross-system pathway, as there is little benefit to working collaboratively to improve student preparation and transitions if those students can only enter the health pathway program by chance.

The root causes of college health pathway program impaction appear to have received little study, in large part due to the lack of mechanisms to measure impaction. Each health program must report to the certifying board the number of qualified applicants and the number of seats in their program, but this data has not been collected elsewhere at the time of this writing.

Providing all students access to health industry work-based learning experiences is a challenge for high school health pathways as well, particularly when programs emphasize clinical internships. Moreover, when it is normal for programs with 30 seats to have 180 applicants, students tend to apply to multiple programs to increase their chances of getting a seat. And many of those who don't get in will apply year after year. Even more challenging is measurement of impaction in pre-requisites, which vary by program and are often under a separate department, for example, Science. The recently begun reorganization of community colleges toward "Guided Pathways" may improve student success in meeting prerequisites if disciplines that relate to broadly defined career fields are grouped to increase opportunities for contextualization and student support. In the meantime, CoP members initiated a survey of all health pathway heads in the college district to begin measuring the extent of the problem. Further research is clearly needed in this area.

A second system alignment challenge is related to the demand for clinical placements. College health pathway students are required to complete preceptor-supervised practicums in a clinical setting to obtain certification. College programs are dependent upon health industry partners to access placements and preceptors. College faculty reported (Minutes, March 21, 2017), that turnover in the health workforce due to retirements is increasing and industry partners are reluctant to allow preceptorships when new employees need training. Some employers have also begun charging for preceptor staff time, which limits those placements to private colleges as community colleges are legally unable to pay for placements. Limited access to industry placements hinders expansion of community college program capacity even where industry demand is increasing.

"When faculty cannot look across the K12-postsecondary divide and see "their" students, it is difficult to envision themselves as part of a cross-system pathway."

It is often not feasible to provide all students with access to clinical placements, particularly given their limited availability, the logistics involved, and the effort required to prepare students appropriately. These challenges can lead to disparities in access to high quality work-based learning experiences. The CoP identified industry-involved community service and service learning approaches focused on public health and health education, such as Y-Plan (D. McKoy, Vincent, & Bierbaum, 2011; D. L. McKoy & Vincent, 2007) as a valuable alternative approach to work-based learning.

The class the CoP presented as a hinge course was envisioned as a capstone early college credit course that could facilitate such work-based learning experiences while also emphasizing cultural competencies, the social determinants of disease, and critical soft skills. This content would provide a solid foundation for any of the health professions.

"Many high school faculty in health pathways across the region increased their knowledge about industry demands, career options and available community college programs over the course of these two years."

The shortage of health pathway faculty is a third problem common to both high school and community college pathways. As in other STEM-related fields, the relatively low pay and challenging working conditions make it difficult to recruit industry professionals into the classroom. Moreover, health pathways often require instructor-level certifications. All four high school health pathways involved in the first year had challenges finding appropriately credentialed faculty for their CTE courses. The inability of the one high school to find a CTE teacher resulted in the lead teacher managing seven courses, each with over 30 students. High school health pathways that cannot find

credentialed CTE teachers for their CTE core sequence cannot access much of the funding for essential equipment and supplies. College health pathways are challenged to expand the number of available seats with a shortage of qualified faculty.[2]

Conclusion

The health pathway CoP brought together faculty from two different systems with a common interest in aligning curriculum, establishing early college coursework, and developing student supports, in order to improve student success in transitions, eliminate disparities in student outcomes, and strengthen instructional practices in health career pathways. The social learning context and peer support pathway leaders experienced allowed them to contribute to the process of aligning their respective districts' health pathways and connected their efforts to improve their own programs to the broader state effort to align the two systems.

Many high school faculty in health pathways across the region increased their knowledge about industry demands, career options and available community college programs over the course of these two years. Nevertheless, curricular alignment was only able to move forward through faculty-to-faculty articulation agreements, and the development of contextualized high school core academic coursework in English and Chemistry. Without significant progress by system leaders on district-to-district CCAP agreements, dual enrollment courses critical for equitable access to postsecondary success will not move forward. Continued progress in this arena depends upon the continued investment of leadership and staff time to consummate agreements.

As a venue for diving deeply into the specific constraints to cross-system pathway development within an industry sector facing many challenges, the CoP was able to identify key barriers to system alignment with which leadership must now grapple, such as program impaction, the shortage of pathway faculty, and the consequences of these for data collection and outcome analysis. While the CoP continues to be a productive means of moving system alignment efforts forward, ongoing facilitation of the cross-system collaboration is essential to maintaining momentum.

[2] There are few measures of teacher shortages in CTE fields. Root causes include a significant salary and status differential, social security disincentives, lack of induction supports, and the difference in skills required and working conditions (Johnston & Stern, 2015).

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