STEM TRANSFER PARTNERSHIP SERIES

Progress in Improving STEM Transfer Partnerships Pathways

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The STEM Transfer Partnership (STP) initiative aims to enhance low-income transfer student outcomes by modifying transfer processes and supports at two-year and four-year institutions. Our ongoing formative assessment of STP team members' efforts highlights the importance of recognizing and understanding the nuances involved in systems change. Acknowledging the progression inherent in the change process is essential, as it is the precursor for improving student outcomes. Changing systems is a complex endeavor to both facilitate and evaluate. In this data note, we use a framework proposed by Latham (2014) to evaluate the STP initiative and provide insights into the structural revisions in our STEM transfer partnerships to date and how they are tied to improved transfer pathways.

INTRODUCTION

The STEM Transfer Partnership (STP) initiative seeks to create systemic change within STEM degree pathways in Washington through collaboration between teams of faculty and staff from nine pairs of two-year and four-year institutions across the state. These teams are supported by Community College Research Initiatives (CCRI) to work together to improve STEM transfer processes by serving as institutional context experts and determining the focus of their efforts (see Cate et al., 2022 for more details). STP teams have worked within institutional pairs for eighteen months to understand and dismantle obstacles to low-income STEM transfer students' bachelor's degree completion. Each team's unique context has led to different areas of focus and routes toward their goals. Recognizing the importance of understanding the process of creating and implementing change (Century & Cassata, 2016), we share a snapshot of STP progress to capture the initial, essential advancements across teams. This brief delves into the factors propelling their change and also highlights the tangible strides made by STP teams in their pursuit of fostering positive transformations.

FRAMEWORK TO EVALUATE LONG-TERM SYSTEMS CHANGE

Latham's evaluation method, designed to address systems change within human service initiatives to enhance client outcomes (Latham, 2014), serves as a valuable framework for analyzing the initial stages of our STP outcomes. The framework highlights the importance of collaboration to create systems change, by removing structural barriers and adding conducive structures to improve pathways. In the framework, systems change takes place in two realms: pathways and structural changes. Pathways are inter-organizational arrangements that provide services and programs to support participants' progress to achieve their desired outcomes. Structures create the context in which pathways function, through policies,

practices, regulations, resource allocations, culture, and knowledge (Latham, 2014). The structural changes can remove barriers and create opportunities to develop more effective pathways that lead to improved individual outcomes, and in our case, transfer student outcomes (Fig. 1). Ultimately, systems change "is about changing the structures that shape our ability to improve pathways" (Latham, 2014, p. 13).

Assessing the impact of STP activities on pathways is crucial to evaluating the teams' efforts. The data in this brief elucidates the variety of changes created by teams of faculty and staff for their unique contexts, which are the essential antecedents to improved transfer student outcomes at their institutions. We also share input from team members about the STP collaborative process and their experiences. Most teams maintain that it is too early to quantify changes in student outcomes. However, their efforts are building the foundations and relationships necessary for current and future transfer improvements. In the following section, we describe the program background and the data sources for this brief.

Figure 1. Adapted from Latham (2014)

PROGRAM BACKGROUND AND DATA SOURCES

In early 2022, the STP teams began their work together by gathering data, conceptualizing, designing, and co-creating an action plan to improve low-income STEM transfer student outcomes. Central to this work have been the institutional agents leading their efforts, with CCRI supporting them through coaching, structured protocols to define and direct their initiatives, technical assistance on partnership and process improvement, and resources to meet (Cate et al., 2022). Developing each team's self-determined direction has been an iterative process of implementing, revising, and adapting teams' action plans. Because of the importance of student input in creating successful change efforts, these teams met the challenge of gathering student feedback in multiple modalities, helping inform their efforts (Cate et al., 2023). Those iterated action plans led to structural changes to improve transfer pathways and student outcomes (described below). The preliminary steps of systems change are what facilitate student-level changes. This data note highlights the change processes, the structural changes made, and how those structural changes can ultimately improve transfer pathways for students.

The data utilized for this brief include coaching meetings notes and documents, as well as notes and transcripts from the fourth convening. CCRI facilitates full-day convenings every six months for the entire STP community of practice to learn from and share with each other. The fourth convening focused on discussing past data, accomplishments, and what data teams have to demonstrate their progress towards improved outcomes for low-income transfer students. Team members also discussed ideas for sustaining this work beyond the grant. This report shares findings from those data sources regarding practitioners' understanding of the progression of their work, as well as the structural and pathway changes they have instituted thus far. In the following section, we describe aspects of collaboration that have facilitated current and future structural changes.

EFFECTIVE COLLABORATION: RELATIONSHIPS, LEARNING AND CONTINUOUS IMPROVEMENT

Our teams have highlighted that their success in supporting transfer students stems from building relationships and, for many, building from the

"ground up." This approach has allowed for a deeper understanding of transfer students' experiences and how best to support their needs. Emerging in our work are the elements of collaboration that enable the implementation of structural and pathway changes and can ultimately contribute to student level improvements.

Relationship Building

Ongoing relationship building is crucial to achieving lasting institutional change and positively affecting transfer student experiences in the long term. One team described their relationship building efforts below.

> *What was fundamental in our design of this is the idea of building it from the ground up... if we just waited for the numbers of students to go up, to me, it's doing just a disservice because you're missing out on all the foundational building stuff that you're talking about.*

Another team built on their prior relationships to co-create an introductory course designed around "needs of students rather than content," which took approximately 18 months to construct and implement. Thus, when asked about student-level impact, they did not have data about student-specific outcomes but instead pointed to the permanent change the course would make on their institutions.

> *Our intervention was mostly concerned with designing a course in which students and faculty from both institutions participate. The course design and approval process took considerable time ….what we've done here is going to influence the institution in ways that we never imagined.*

Learning in Partnership

For many teams, being part of STP has allowed them to identify new barriers and solutions for their transfer students. One team explained how their monthly meetings have led them to develop future collaborative goals.

> *I think the most powerful thing that has come out of our partnership has been the very regular meetings we've had and the conversations that have spawned so many ideas which are going to actually form future proposals, I'm sure.*

Another team reported that their STP efforts have led to understanding where their support was lacking and which students were most impacted. They are now focused on closing that gap.

> *Our work has revealed critical gaps in currently available support systems in student advising and recruitment…some of the impacts we have observed point to a significant equity gap in the share of challenges shouldered by female students in particular (based on excess credit data).*

Continuous Improvement

For most of the teams, their relationships and time together have created the conditions necessary for them to develop multiple supports for their students, now and in the future. Throughout their time together, STP teams continue to create modifications, some building off original initiatives and others finding new ways to collaborate. As one team noted, their partnership has led to many improvements, some that might not yet be measurable at this point.

> *We are energized by the partnership, and our discussions have generated significant change already, but also ideas for additional improvements that are not achievable within the scope of this grant and timing.*

A second team noted how their current work is just a beginning and that having more time would allow for consequential engagement in relationship development and institutional change.

> *We view this project as a successful pilot that provides a base for expansion. We aren't done yet. The scope and scale require a longer time frame. We want to more closely cement our relationships AND institutional processes.*

To date, much of the work of the STP teams has concentrated on fortifying the institutional infrastructures to enhance pathways essential for fostering positive transfer student outcomes. The

above examples provided by the teams make visible several important aspects of collaboration that were vital to their progress: cultivating relationships, learning together, and continuous improvement. These serve as essential elements in facilitating transformation efforts. Next, we explore the specific structural and pathway improvements brought about by the collective efforts of the STP teams.

STRUCTURAL CHANGES WITHIN STP

According to Latham's (2014) framework, it is important to notice how institutional structures change and how these structural changes can lead to more effective pathways. The institutional contexts of the STP teams vary widely; thus, the focus of their efforts also varied. However, the institutional changes can be grouped into five focus areas. In Figure 2, we describe the modifications teams have made thus far to curriculum, instruction, advising, academic and student supports throughout the STP.

As Latham (2014) explains, it requires structural changes to remove constraints and enable pathway improvement. The following section describes the connections between structural changes within the STP teams and the potential for transfer pathway improvements.

HOW STRUCTURAL CHANGES ENABLE MORE EFFECTIVE TRANSFER PATHWAYS

Understanding and Access

Many teams wanted to provide clear, accurate and easily accessible information about the courses required at each institution for completing a bachelor's degree, and to provide better access to those courses. To address this issue, most teams worked to improve transfer maps to a bachelor's degree and increase access to that information. The increased information access took many forms, such as enhanced websites, STEM transfer orientation sessions at a 4-year institution, and off-boarding modules for transfer students at a 2-year institution. Some teams focused

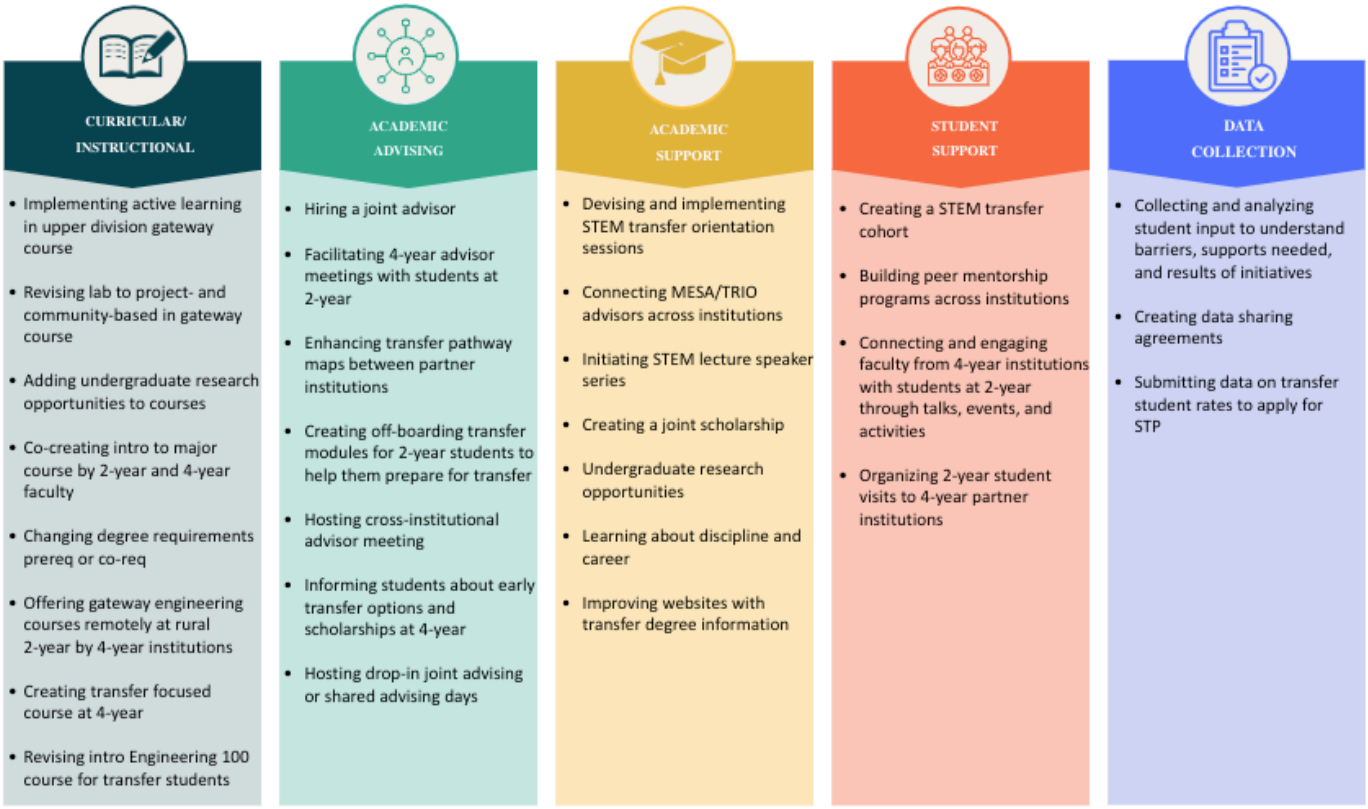

Figure 2. Structural changes enacted by STP teams.

on providing timely access to coursework by changing prerequisites and creating co-requisites. One 4-year institution provided remote access to an essential sophomore-level course needed for the major, which was not available at the 2-year institution. STP teams provided transfer students with accurate course information and access to required courses through multiple methods.

Coordination of Advising

Collaborative advising across transfer institutions allowed staff and faculty to identify advising problems and solutions, stay informed about any changes, and provide students at 2-year institutions access to 4-year advisors. The multiple ways of coordinating advising for STP teams included cross-institutional advisor meetings, 4-year advisor meetings with 2-year students, drop-in shared advising sessions, and hiring a joint advisor who works for both institutions. All new advising structures serve to improve information flow and transfer students advising experience.

Pass Rates and STEM Identity

Several changes were made to the curriculum to increase student pass rates and enhance STEM identity and self-efficacy. One team discovered that transfer students had lower pass rates in a gateway course at the 4-year institution. This led to the addition of active learning to the lecture and project-based learning to the lab. Another 4-year institution created a transfer course to help students adapt to the new school's structure. An additional team co-created an introductory course that applies toward the major and involves faculty across institutions. STP teams are using curricular opportunities to positively impact their STEM transfer students' success.

Connections

As students transferred to 4-year institutions, they often needed help understanding the new structures and supports and lacked contacts there. To bridge this gap, several teams organized campus visits. Faculty members from 4-year institutions attended events at 2-year colleges and supplied activities for students that created human connections across institutions. Additionally, teams arranged field trips for 2-year students to visit 4-year institutions, where they engaged directly with faculty, advisors, and admissions staff, in a variety of activities, experiencing what that campus had to offer. Two teams utilized peer mentoring programs across institutional pairs, and various teams coordinated with MESA and TRIO advisors to create inter-institutional connections. These efforts provide students with an opportunity to understand the 4-year structures better, as well as a sense of belonging once they have transferred.

Data Use

All teams were required to gather data on their transfer students as part of the STP application process. This data and other data, including student input, has helped teams understand obstacles to transfer and completion, which has influenced the focus of their

Table 1:

Structural Changes	Conditions for More Effective Pathways
Understanding and Access • Enhancing transfer pathway maps between partner institutions • Improving websites with transfer degree information • Creating off-boarding transfer modules • Devising and implementing STEM transfer orientation sessions • Changing prerequisites or corequisite courses • Offering gateway engineering courses	Providing resources for increased **understanding and access** to necessary coursework for transfer students' bachelor's completion.
Coordination of Advising • Hosting regular cross-institutional advisor meetings • Facilitating 4-year advisor meetings with 2-year students • Hosting drop-in joint advising or shared advising day • Hiring joint advisor	Improved **coordination of advising** structures and increased information flow across institutions.

Table 1 (continued)

Structural Changes	Conditions for More Effective Pathways
Coordination of Advising • Hosting regular cross-institutional advisor meetings • Facilitating 4-year advisor meetings with 2-year students • Hosting drop-in joint advising or shared advising day • Hiring joint advisor	Improved **coordination of advising** structures and increased information flow across institutions.
Pass Rates, Cultivating STEM Identity • Implementing active learning in upper-division gateway course and lab • Creating transfer focused course at 4-year • Co-creating intro to major course • Revising intro Engineering 100 course • Adding undergraduate research opportunities • Initiating STEM lecture speaker series • Creating a joint scholarship • Informing students of early transfer and scholarship options at 4-year	More students have access and potential for success by improving **pass rates, cultivating STEM identity** and self-efficacy, and reducing financial barriers.
Connections • Connecting and engaging faculty from 4-year institutions with students at 2-year through talks, events, and activities, organizing student visits to 4-year partner institutions • Building peer mentorship programs across institutions • Creating a STEM transfer cohort • Connecting MESA/TRIO advisors across institutions	Creating more student **connections** to STEM disciplines and careers. Providing linkages across institutions to improve students' understanding of 4-year systems and sense of belonging.
Data Use • Submitting data on transfer student rates to apply for STP • Creating data-sharing agreements • Collecting and analyzing student input to understand barriers, supports needed, and results of initiatives	**Data used** to increase understanding and removal of barriers to transfer and completion.

structural changes. Teams also gather data to assess whether or not their actions are moving them toward their goals. Collectively, these efforts support the creation of conditions for more effective pathways. Table 1 summarizes how the structural changes from the different focus areas in Figure 2 create the conditions for improved transfer students' pathways.

CONCLUSION AND IMPLICATIONS

The STEM Transfer Partnership initiative is facilitating a collaborative and dynamic approach to improving outcomes for low-income STEM transfer students. Our ongoing formative assessment highlights the importance of recognizing the nuances of systems change, including the incremental and long-term process of change, which is fundamental to enhancing student outcomes. Latham's (2014) framework enables us to appraise our progress and shed light on how the structural changes within STP can impact the pathways available to students.

Implementation research delves into the essence of change, asking what it truly takes for organizations and systems to undergo transformation, and emphasizing the context and conditions that influence the enactment of innovations (Century & Cassata, 2016). To support our STEM transfer partners' current and future change efforts, this data note documents how specific changes are made and the contextual factors that influence their implementation.

The STP teams, including staff and faculty from various institutional settings, have navigated a transformative journey by focusing on understanding and dismantling obstacles for their STEM transfer students. The data presented here captures how the unique contexts of each partnership shaped a variety of initiatives and changes by the STP teams to remove barriers and create conducive conditions for improved STEM transfer pathways. The STP teams and CCRI recognize the significance of building relationships, learning, and

continuous improvement as crucial steps in the process of effecting positive change. While quantifying the impact on student outcomes is an ongoing endeavor, it is also important to document the foundational work created through relationship building and structural changes. This work is continuing, with teams viewing the project as a successful model that provides a base for expansion.

This data note is a testament to the ongoing efforts, collaborative spirit, and impactful structural changes within the STP initiative, which are creating conditions that foster the success of STEM transfer students from low-income backgrounds. By exploring the factors influencing change, we pave the way for implementing more effective and efficient strategies that aim to improve STEM transfer pathways. This documentation of both process and progress can serve new, future transfer partnerships by providing direction and inspiration to their work.

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About the University of Washington's Community College Research Initiatives
The CCRI team conducts research and development to generate actionable knowledge to advance equity in the field of higher education. CCRI — a program of Undergraduate Academic Affairs — focuses on studying the experiences of underserved student groups that use community colleges as their entry point to higher education and the role that institutions play in equitable student educational and employment outcomes. Their goal is to leverage this research to effect change in postsecondary education at all levels. To learn more about CCRI, visit https://www.washington.edu/ccri/, and follow us on LinkedIn, https://www.linkedin.com/company/ccri-uw/.

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Ascendium Education Group is a 501(c)(3) nonprofit organization committed to helping people reach the education and career goals that matter to them. Ascendium invests in initiatives designed to increase the number of students from low-income backgrounds who complete postsecondary degrees, certificates and workforce training programs, with an emphasis on first-generation students, incarcerated adults, rural community members, students of color and veterans. Ascendium's work identifies, validates and expands best practices to promote large-scale change at the institutional, system and state levels, with the intention of elevating opportunity for all. For more information, visit https://www.ascendiumphilanthropy.org.

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