Department-Level Instructional Change: Comparing Prescribed vs. Emergent Strategies

Kathleen Quardokus Fisher, Charles Henderson

Abstract: The improvement of undergraduate science, technology, engineering and mathematics (STEM) instructional practices is the focus of many change initiatives in higher education. These efforts are expected to be most effective when they focus on academic departments as the unit of change. However, little guidance exists for change agents seeking to promote department-level change. In this paper, case studies of change activities in five academic departments are analyzed through the lens of two change frameworks. The two frameworks are representative of two distinct approaches to change, prescribed change that focuses on the activities of a guiding coalition of leaders and emergent change that focuses on promoting new ideas that are developed by participants as part of the change initiative. Analysis focuses on successes and missed opportunities within each department from the perspective of each change framework. The results provide guidance on how change agents might design activities to create vision, motivate participants, build momentum, and institutionalize change within their departmental context. Through familiarity with multiple perspectives on change, a change agent can plan change that matches the context of his or her department and increase the likelihood of success.

Keywords: Academic department; change; STEM; instructional improvement; higher education
Introduction

Many stakeholders identify how university systems could and should improve. One issue that continually garners attention is the need to provide quality undergraduate STEM educational experiences by creating inclusive environments (Burke & Mattis, 2007; National Research Council, 2011), improving student learning outcomes (National Science and Technology Council, Committee on STEM Education, 2013), and changing reward systems to value effective instructional practices (DeHaan, 2005; Seymour 2002). Change agents actively engage in activities meant to influence these and other positive changes in undergraduate STEM education. Change activities take the form of prescribed initiatives (e.g., strategic planning, de la Harpe & Thomas, 2009) and emergent initiatives (e.g., grass roots change, Brigham, 1996), as well as combinations of both approaches (e.g., Gibbs, Knapper, & Piccinin, 2009). Yet, little guidance exists to help change agents successfully plan for and enact change initiatives. In this paper, we describe how change occurs from the perspective of two change frameworks. Each framework provides a different perspective on how change agents might structure activities, understand challenges, and enact solutions to fit their context. We use case studies from an institution-based change initiative involving five STEM departments to illustrate these perspectives. We argue that change agents will be more successful if they match their change approach to their context by being able to think about change in more than one way. Case studies of five STEM departments provide examples of change agents’ challenges and successes in matching change activities with context.

We begin by identifying and characterizing two frameworks that change agents can use to plan for change. We demonstrate how both frameworks emphasize four basic activities that are essential for change initiative success. We then use department case studies to interpret
change through the two frameworks and to demonstrate how the frameworks help change agents identify productive change activities.

Four Challenges of Institutional Change

Department-level change frames our argument. Recent studies of change in higher education have suggested the importance of understanding and focusing on department-level change because departments typically make decisions regarding curriculum and tenure and department members often discuss their views about instruction in both formal and informal venues (Edwards, 1999; Gibbs, Knapper, & Piccinin, 2008; Quardokus & Henderson, 2015; Wieman, Perkins, & Gilbert, 2010). Thus, researchers and change agents must identify departmental features that support and encourage change. Departmental change does not ignore the individual; instead, it recognizes that individual change is not enough. To be successful, a change agent uses tools to think about and design change initiatives that situate individual change within the larger institutional system.

Department-level change is an example of structural change. Henderson, Beach, and Finkelstein (2011) identified two types of structural change. One type, prescribed change, has specific outcomes that the change initiative seeks to realize. The other type, emergent change, develops the desired outcomes throughout the initiative with input from participants. Prescribed change and emergent change have different assumptions about how and why change occurs. They differ on where new ideas should be developed (by leadership or by ordinary members of the organization), when new ideas should be presented (before change occurs or throughout the change process), and who is responsible for encouraging, recognizing, and celebrating new ideas across the organization (leaders or all members). Many frameworks describe the change process.
within these two categories (Borrego & Henderson, 2014). We identify two specific frameworks that provide tools for change agents to plan for and understand structural changes. Kotter’s Eight-Stage Leadership Process represents prescribed change (Kotter, 1996). Complexity Leadership Theory represents emergent change (Uhl-Bien, Marion, & McKelvey, 2007). As shown in Table 1 and discussed below, both frameworks recognize four types of activities that are essential for change initiatives: create vision, motivate participants, build momentum, and institutionalize change.

Table 1: Overview of the four essential types of activities for structural change.

<table>
<thead>
<tr>
<th>Type of Change Activity</th>
<th>Prescribed</th>
<th>Emergent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Vision: Change involves new ideas</td>
<td>Vision is developed by leadership</td>
<td>Vision emerges during the change process</td>
</tr>
<tr>
<td>Motivate Participants: People need to behave differently</td>
<td>Participants are provided with motivation and encouragement to follow the vision</td>
<td>Participants are provided with motivation and encouragement to create new ideas that lead to the vision</td>
</tr>
<tr>
<td>Build Momentum: New ideas and practices are spread beyond their initial location</td>
<td>The vision is expanded to include more people and more parts of the organization.</td>
<td></td>
</tr>
<tr>
<td>Institutionalize Change: The environment is changed to support sustained use of new ideas and practices</td>
<td>Organizational structures are changed to support the vision.</td>
<td></td>
</tr>
</tbody>
</table>

Theory: Two Frameworks of Structural Change

Two frameworks of structural change, the Eight-Stage Leadership Process (prescribed) and Complexity Leadership Theory (emergent) operationalize the essential activities of change. The frameworks provide interpretations of the change process that guide what activities can be enacted within various contexts to support change. For example, in the Eight Stage process,
powerful leaders define the new ideas of change and promote them in the organization. However, in Complexity Leadership Theory, middle managers ensure that the formal leaders do not stifle the development of innovative ideas. The following section outlines each framework and details how each framework suggests approaching the four essential change activities.

Eight-Stage Leadership Process

The Eight-Stage Leadership Process is a prescribed change approach developed by Kotter (1996) (Table 2). Henderson and colleagues (2011) describe prescribed approaches as “policy change.” This change process includes the creation of policy and the management of policy compliance (e.g., Barth, 2013; Elton, 2003). Kotter describes policy adoption in Eight Stages that are informed by his experience with change initiatives within many types of organizations. He developed the Eight Stages to help change agents avoid the eight common mistakes. The Eight Stages are sequential. That is, success in earlier stages is necessary for success in later stages.

Kotter’s Eight Stages were chosen to represent a prescribed structural strategy for two reasons. First, Kotter’s Eight Stages include the features of prescribed change: policy development and activities to encourage compliance. Second, the Eight Stages are a well-known approach to change in organizations (e.g., Cowan-Sahadath, 2010; Stummer & Zuchi, 2010) and in engineering education change initiatives (e.g., Graham, 2012; Quinn et al., 2012; Borrego & Henderson, 2014). This framework allows for interpretation of the change process within one cohesive framework that represents key features of policy change.

The first three stages prepare an organization for change through the development of new ideas (the first type of activities: create vision). Establishing a sense of urgency (stage 1) requires a change agent to convince the leadership that “business as usual” will be more detrimental than
attempting change. This can be accomplished by leveraging outside pressure for change (e.g., industry’s expectations of graduates’ competencies). Once the need for change is established, the change agent creates a guiding coalition (stage 2). Change agents should involve powerful, knowledgeable leaders in the coalition to be the drivers of change. The first task of the guiding coalition is vision and change strategy development (stage 3). The vision should be directly attached to the sense of urgency to create interest within the organization. The theme of these stages is identifying new ideas (create vision) at the beginning of change by a powerful guiding coalition.
### Table 2: Types of change activities and the Eight-Stage Leadership Process (Kotter, 1996)

<table>
<thead>
<tr>
<th>Type of Change Activity</th>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Vision: Change involves new ideas</td>
<td>1. Establishing a Sense of Urgency</td>
<td>The change agent convinces the organization that the only reasonable response to a threat is widespread change.</td>
</tr>
<tr>
<td></td>
<td>2. Creating the Guiding Coalition</td>
<td>The change agent recruits powerful leaders to drive the change initiative.</td>
</tr>
<tr>
<td></td>
<td>3. Developing a Vision and Strategy</td>
<td>The guiding coalition develops a vision. The vision should address the sense of urgency.</td>
</tr>
<tr>
<td>Motivate Participants: People need to behave differently</td>
<td>4. Communicating the Change Vision</td>
<td>The guiding coalition continually communicates the vision to the organization and acts as role models of change.</td>
</tr>
<tr>
<td></td>
<td>5. Empowering Broad-Based Action</td>
<td>The guiding coalition provides resources and rewards to the members of the organization for making appropriate changes.</td>
</tr>
<tr>
<td>Build Momentum: New ideas and practices are spread beyond their initial location</td>
<td>6. Generating Short-Term Wins</td>
<td>The guiding coalition creates situations that will lead to early successes. They communicate these successes to the organization to maintain motivation to change.</td>
</tr>
<tr>
<td></td>
<td>7. Consolidating Gains and Producing More Change</td>
<td>The guiding coalition pushes the change initiative to address new, untouched areas of the organization.</td>
</tr>
<tr>
<td>Institutionalize Changes: The environment is changed to support sustained use of new ideas and practices</td>
<td>8. Anchoring New Approaches in the Culture</td>
<td>The leadership integrates changes with the culture and systems of the organization.</td>
</tr>
</tbody>
</table>

The fourth and fifth stages motivate people to change their behavior (the second type of change activity). Communicating the change vision (stage 4) spreads the change conversation beyond the guiding coalition by referencing the vision in emails, memos, and other communication. The guiding coalition leads by example by enacting the vision within their practices. In higher education, the guiding coalition may pilot programs within their classrooms. The guiding coalition also empowers broad-based action (stage 5) to involve as many people as
possible in change by removing barriers and providing resources to make change possible. The purpose of these stages is motivation. This motivation for change is fostered by the guiding coalition through communication about the vision and support for broad-based action.

Stages six and seven build the momentum of change in the organization (the third type of change activity). By generating short-term wins (stage 6), the guiding coalition keeps individuals engaged in change. The coalition plans activities that will have positive results early in the change process (approximately the first twelve months). Positive results are celebrated to motivate further change. This leads to consolidating gains and producing more change (stage 7). This stage avoids declaring victory prematurely. The guiding coalition continues to promote the vision by moving change to new, untouched areas of the organization. The purpose of these stages is building momentum across the organization. The new ideas spread beyond the initial participants because of connections of celebrated successes to the change initiative.

The final stage focuses on institutionalization (the fourth type of change activity). Anchoring new approaches in culture (stage 8) leverages the structural features of the organization to maintain changes. Change agents anchor the change in the norms of activities within the organization. For example, in an academic department, after a change initiative, it may become the norm to expect new hires to have knowledge of evidence-based instructional practices. The purpose of this stage is institutionalizing change in the structure of the organization.

The Eight Stages are a structural, prescribed approach to change. The process begins by developing a vision and then motivating others to follow this vision (prescribed); the process involves individuals of the organization and changes the structures of the organization (structural). The Eight Stages can be portioned into the four types of change activities (Table 2).
These activities describe specific actions that change agents take to accomplish change (create vision, motivate participants, build momentum, and institutionalize changes). In the analysis section, we use these activities to identify change agent actions in the case studies that were beneficial for change and missed opportunities where change agents could have used the Eight Stages to promote change.

Complexity Leadership Theory

Complexity Leadership Theory (CLT) is an emergent approach to change developed by Uhl-Bien and colleagues (2007) (Table 3). It asserts that change is a complex, emergent process that arises from the leadership activities of individuals throughout an organization rather than being managed by leaders. CLT identifies the roles of Administrative, Adaptive, and Enabling leadership in the change process. Administrative leaders are formal leaders who create the regulations and rules of the organization. Adaptive leadership consists of the creative, generative interactions of at least two individuals within the organization. These individuals can have any role in the organization; they may be formal leaders, but they could also be typical workers. Enabling leaders are the change agents. Enabling leaders (a) encourage Adaptive leaders to develop new ideas, (b) promote communication between the developers of new ideas (Adaptive) and the formal leaders (Administrative), and (c) work to institutionalize productive innovations that develop from new ideas.
<table>
<thead>
<tr>
<th>Leadership Roles</th>
<th>Leadership Activities</th>
<th>Position within the Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative Leadership</td>
<td>Create conditions for interactions that can lead to emergent new ideas</td>
<td>Formal leaders</td>
</tr>
<tr>
<td>Adaptive Leadership</td>
<td>Engage in interactions and develop new ideas</td>
<td>Any employees (likely to be overlooked if interactions are only between typical workers)</td>
</tr>
<tr>
<td>Enabling Leadership</td>
<td>Promote development and use of productive new ideas</td>
<td>Any employees (often middle management)</td>
</tr>
</tbody>
</table>

CLT was chosen to represent emergent, structural change for two reasons. First, it represents the emergent change approach that higher education researchers expect to be important for change. Emergent change includes promoting interactions between participants and developing a flexible vision (e.g., Eckel & Kezar, 2003). Second, CLT has been informative in organizations other than higher education (e.g., Plowman, Solansky, Beck, Baker, Kulkarni, & Travis, 2007). Our analysis investigates how CLT can contribute to understanding of change in academic departments.
Table 4: Types of change activities and the Complexity Leadership Theory (Uhl-Bien et al., 2007)

<table>
<thead>
<tr>
<th>Type of Change Activity</th>
<th>Cycle Events</th>
<th>Description</th>
<th>Leadership Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivate Participants:</td>
<td>• Disrupt existing patterns to encourage new interactions between individuals</td>
<td>Change agents encourage innovation by promoting interaction, interdependency, and tension. This is often done by disrupting existing patterns and developing simple rules to guide interactions.</td>
<td>Enabling leaders (who have the support of Administrative leaders or are Administrative leaders themselves) develop structures that encourage colleagues to engage in Adaptive Leadership activities.</td>
</tr>
<tr>
<td>People need to behave</td>
<td>• Develop structures that create interdependency to encourage teamwork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>differently</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Vision: Change</td>
<td>• Encourage dissenting opinions</td>
<td>Change agents encourage the communication of new ideas.</td>
<td>Enabling leaders (as Administrative leaders or through encouragement of Administrative leaders) provide an environment where Adaptive leaders can be successful.</td>
</tr>
<tr>
<td>involves new ideas</td>
<td>• Avoid stifling regulations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Articulate the vision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build Momentum: New</td>
<td>• Interpret emerging events to identify new knowledge</td>
<td>As new innovations arise, they are promoted if they advance the shared vision of the organization and fit the simple rule.</td>
<td>Enabling leaders promote the work of Adaptive leaders by interpreting and promoting productive ideas.</td>
</tr>
<tr>
<td>ideas and practices</td>
<td>• Communicate emerging knowledge and associated new practices to formal leaders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>are spread beyond their</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>initial location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutionalize</td>
<td>• Promote institution-level learning by modifying structures to align with new knowledge and practices</td>
<td>Change agents in Administrative leadership positions develop structures that sustain the change from the earlier cycles.</td>
<td>Administrative leaders modify organizational structures to align with new knowledge and practices.</td>
</tr>
<tr>
<td>Changes: The environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is changed to support</td>
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<td></td>
<td></td>
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<tr>
<td>sustained use of new</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ideas and practices</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The actions of leadership are a cycle that forms an ongoing, iterative process (Table 4 and Figure 1). The first part of the cycle is motivating new behaviors by supporting innovation through Adaptive leadership (change activity: motivate participants). In contrast to the Eight
Stages, motivation precedes vision development. An Enabling leader promotes Adaptive leadership by encouraging interaction, interdependency, and tension throughout the organization. This could take the form of disrupting existing patterns by assigning teamwork on tasks where individual success is dependent on group outcomes. For example, two instructors may be assigned to co-teach a course and struggle to write the final exam because each values a different approach. The new co-teaching assignment is a disruption of patterns and an interdependent activity. The different approaches to exam writing represent the varying needs of the instructors. Finding a solution to this tension (that is acceptable to both instructors) may require the instructors to develop an innovative approach to exam writing. These types of arrangements are likely to motivate new behaviors. A change agent can guide these interactions through establishment of a mission of the project or simple rules for the organization to follow (Plowman et al., 2007; Uhl-Bien et al., 2007). A simple rule defines the type of outcome an action should create, although the details of the action are not specified. For example, a simple rule may be that graduates of a program should develop written communication skills. In the co-teaching example, this simple rule would not prescribe a specific solution (such as a particular style of exam), but it can determine if specific solutions (such as exam questions with open-ended responses) fit within the simple rule.

The second cycle event is encouraging the communication of new ideas developed in Adaptive leadership to develop a shared vision (change activity: create vision). This process is facilitated through encouraging dissenting opinions, avoiding stifling conditions, and articulating the vision. Encouraging dissenting opinions and avoiding stifling conditions allow for Adaptive leadership to share new ideas with members of the organization. New ideas lead to an articulation of the vision.
The third event cycle is promoting changes by spreading the shared vision across the organization (change activity: build momentum). An Enabling leader identifies productive new ideas that fit the vision (including the simple rule), provides language to frame and discuss these ideas, and promotes these ideas to Administrative leaders. This role is likely to be an important activity of middle managers. A middle manager has interactions throughout the organization that can help identify new ideas and connections with Administrative leaders to promote these ideas. In higher education organizations, these middle managers may be department chairs who have connections with deans and provosts, but are also connected to instructors.

The fourth event in the cycle is institutionalizing changes (change activity: institutionalize changes). Once new ideas fit the shared vision and are shared with the Administrative leaders, the Administrative leaders determine if structures need to be developed to sustain change. If so, the Administrative leaders create structures that support and sustain the new ideas. This step represents the end of a single cycle, but change agents should expect change to be ongoing, even after new structures are in place.

CLT represents a structural, emergent approach to change. It targets all levels of the organization to promote the development of new ideas. Change agents (Enabling leaders) support the emergence of new ideas (Adaptive leadership) by creating interactions with interdependency and tension and communicating new ideas to formal leaders (Administrative leaders) to institutionalize change. In the analysis section, these features of Enabling leadership identify change agent actions in the case studies that were beneficial for change and missed opportunities where change agents could have used these activities to promote change.
Activities Essential to Change: Strategies from Two Frameworks

Both frameworks identify four types of change activities (Table 2 and 4, and Figure 1). The four types of change activities are: creating vision, motivating individuals to adopt new behaviors, building momentum through communication, and institutionalizing change. Because these activities are essential for change to occur and be sustained, change agents face the challenge of addressing the needs of each activity type. When determining what actions are appropriate for promoting change, change agents consider these questions: who is willing to play an important role as an agent of change (e.g., department chairs, deans), what type of events will be well-received (e.g., teaching co-assignments, group discussions) and when can events occur (e.g., during the summer before change, during the process of change in the semester). The answers define the range of activities that are appropriate within the context of change. The two frameworks provide change agents with activities that have been effective within each of the essential activities of change and with flexibility to choose activities that are appropriate within their context. Next, we summarize the activities that each framework suggests to address the four activities of change.
Create Vision

Change requires a vision about better ways of doing things. The Eight Stages require formal leaders of the guiding coalition to identify the vision, to connect it to a sense of urgency and to promote it to the rest of the organization. These activities are the first events in the change initiative. On the other hand, in CLT, new ideas emerge throughout the cyclical change process. CLT suggests that formal leaders should act as Enabling leaders by encouraging and recognizing emerging innovative ideas. This includes creating environments that are not stifling to new ideas and that encourage dissenting opinions. Both frameworks identify important formal leader roles. In the Eight Stages, the formal leaders convince others to accept the prescribed vision. In CLT, the formal leaders bring people together in productive interactions to create an emergent vision.
The formal leaders’ role and the timing of vision development are two of the contextual factors to consider when addressing the change activity of vision development.

Motivate Participants

Motivating change includes convincing the first participants to change their behavior. In the Eight Stages motivation comes from the guiding coalition. Participants are motivated to align their activities with the prescribed vision by communicating the urgency of the vision and by removing barriers to change to empower broad-based action. In CLT, individuals are motivated to engage in new behaviors that can lead to new ideas. Motivation occurs via interactions, interdependency, tension, and a disruption of patterns. In the Eight Stages, motivation is initiated by formal leaders, while in CLT motivation is the responsibility of change agents (Emergent leaders) who creating the critical structural conditions. To motivate participants, change agents consider the timing of motivating change (before or after the vision is developed), the involvement of the formal leaders, the potential for a disruption of patterns, and the willingness of participants to work interdependently.

Build Momentum

Building momentum activities encourage even more individuals to make changes. The Eight Stages build momentum by creating and celebrating short-term wins. The formal leaders identify wins and communicate their connection to the change initiative. CLT also builds momentum through communication; in this case, the Enabling leaders interpret emerging change and communicate change to the Administrative leaders who expand it to the rest of the organization. The context that can support momentum building in the Eight Stages includes a
chair or curriculum committee to provide resources for generating and celebrate short-term wins. However, in CLT, the leaders’ commitment is to highlighting good ideas and communicating the simple rule to guide future innovation. Promoting a simple rule places less responsibility on formal leaders than generating and celebrating short-term wins in the Eight Stages.

Institutionalize Changes

Institutionalizing change is similar in both frameworks; support of formal leaders is important. The formal leaders’ role in the Eight Stages is the conclusion of earlier steps while in CLT, institutionalization happens as new innovations emerge from interactions. Both approaches require changes in the structure of the organization to sustain change. For academic departments, the chair would likely play this formal role. If the chair is involved throughout the change process, then the Eight Stages may be appropriate. However, if the chair is less involved, then Enabling leaders communicate positive changes to the chair and the chair aligns department practices with new ideas.

The case studies demonstrate how these frameworks describe change in the context of STEM departments. We highlight contexts where activities have worked well and where additional strategies were needed to promote change. The guiding research question for this study was: using case studies of change in STEM departments, how do the perspectives of two structural change frameworks identify problems and advocate solutions associated with change within the four types of change activities? Next, we provide context for the STEM change initiative, detail methods of the case studies, and describe change activities (create vision, motivate participants, build momentum, institutionalize changes) using the lenses of the structural change frameworks.
Context

The case studies are five departments at a research, doctoral university involved in a grant-funded change initiative. Faculty members from four of the five departments led the change initiative. Participants were encouraged to incorporate multiple-week authentic research projects into laboratories and/or active learning activities into lectures to help students think like scientists. Emergent change was supported by allowing participants to complete any projects that prepared students to think like scientists. For example, some participants chose to incorporate inquiry-based laboratories. Change initiative supports included learning communities, annual retreats, summer workshops, and assistance from postdoctoral scholars. The change initiative hired seven postdoctoral scholars to work with three of the departments (no department had more than one scholar at a time). The project provided financial support for some participants to change their instructional practices, (e.g., purchase laboratory equipment, hire graduate assistants). Data collection occurred during the first three and a half years.

The primary supports for change were multiple Faculty Learning Communities (FLCs). FLCs consisted of six to fifteen faculty members (some included postdoctoral scholars and graduate students), and met about twice a month during the academic year. FLCs focused on topics of participant interest (such as laboratory projects, large-lecture techniques, and discipline-specific concerns). Topics were identified by personal discussions between change initiative leaders and department members.

Methods

Five department-based case studies provided an in-depth, qualitative understanding of the complex nature of change. In holistic, multiple-case studies, multiple sources of data describe a
single case (Yin, 2009). The data collected (interviews, surveys, change initiative artifacts, and departmental artifacts) identified the department structure, change initiative activities, and social connections. Research participants included department members (change initiative leaders, participants and non-participants in the change initiative, tenure and non-tenure track instructors, support staff, and postdoctoral scholars or graduate students who were involved in change) and members of the teaching and learning center (Quardokus, 2014).

The four-stage analysis sought to understand the process of change of each department. The first stage developed themes from interviews and artifacts using emergent qualitative analysis techniques (Corbin & Strauss, 2008). The second stage articulated or triangulated themes with data from the surveys and arranged themes into a department-level change narrative. Departmental narratives described key actors, events, and context. In the third stage, the narratives were compared to identify similarities and differences. In the last stage, each narrative was interpreted through the lens of two theoretical frameworks (the Eight Stages and Complexity Leadership Theory). The theoretical frameworks provided insight into the importance of the features of the narrative.

Results: Department Narratives

This section provides an abbreviated version of the department narratives. Each narrative identifies changes made in the department (Table 5) and the process of change. In the discussion section, each framework highlights the department activities within the four types of change activities, including challenges faced by some of the departments and suggestions of how these challenges may have been addressed given the context of the department.
<table>
<thead>
<tr>
<th>Department</th>
<th>Members</th>
<th>Change Initiative Participants</th>
<th>Number of Laboratory Courses Changed</th>
<th>Number of Lecture Courses Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead PI</td>
<td>60</td>
<td>9</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Isolated Efforts</td>
<td>25</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chair Directed</td>
<td>40</td>
<td>15</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Community Building</td>
<td>45</td>
<td>18</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Struggling FLC</td>
<td>45</td>
<td>11</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

Lead PI Department

The Lead PI (LPI) department had 60 members; nine members participated in the change initiative, including the PI of the change initiative. The PI identified interested instructors and allotted change initiative funds to support course changes. Changes were made in seven courses (Table 5). Some individuals were interested in making changes but needed funds to support change. The PI allotted project funds to send an individual to a workshop on rewriting laboratories and to buy equipment to conduct experiments for an authentic research experience.

Many of the LPI department instructors worked individually to create course changes, and often non-participating department members (including the chair) were unaware of changes. A course within a disciplinary specialization that was changed to include an authentic research experience was an exception to this pattern. The instructor who was planning to teach the course in the following semester contributed to course changes. The department members with expertise in this specialization met weekly and often included discussion of instructional topics in these meetings. These discussions were a mechanism for the members of the specialization to learn about course changes.
The PI’s personal connections identified change initiative participants. However, the LPI department was also characterized by a lack of communication about the project beyond these participants. Only the group consisting of one disciplinary specialization within the department discussed changes. Many department members were not affected by the presence of the change initiative.

Isolated Efforts Department

The Isolated Efforts (IE) department had 25 members; five department members and one graduate student (later hired as a lecturer) participated in change. Two courses were modified to include multi-week authentic research experiences. A professor and a graduate student transformed one course; an individual department member changed a second course.

The participating department members believed they were the only members concerned with instructional issues. By year three in the change initiative, these individuals discussed teaching with each other, but not with other department members. In addition, the change initiative participants believed the courses they changed would revert back to traditional courses if a different department member were assigned to teach them. The PI suggested that this isolation was created by the perceived importance of multiple-week research projects by most department members. He believed that other department members were invested in understanding how to transfer mathematics skills instead of authentic research experiences.

The change efforts in the IE department did not expand beyond the participants who started them. The participants became isolated from the department possibly due to the difference in instructional priorities of department members. The participants found support for their work from each other and participation in change initiative FLCs.
Chair Directed Department

The Chair Directed (CD) department had 40 members. Fifteen members participated in the change initiative, including two postdoctoral scholars and the department chair. The CD department members modified six laboratory courses. Instructors worked individually to change five courses from step-by-step to inquiry-based laboratories. One faculty member, who did not discuss his changes with colleagues, developed a laboratory with a five-week authentic research experience.

The CD department’s change leaders (the chair and postdoctoral scholars’ mentors) argued that research experiences were inappropriate for the department. Instead, they promoted inquiry-based projects. The change leaders provided several reasons for this alternative goal. First, the PI of the grant (who was an expert in a different discipline) did not understand the challenges related to laboratories in the CD department. Second, authentic research would be too hard to implement with their large numbers of students and available personnel. Third, it would be dangerous to allow undergraduate students too much freedom with laboratory equipment. Furthermore, the change leaders knew that the department members wished to have undergraduates work in their research laboratories. However, the current curriculum was not preparing students for this role. They suggested that inquiry-based laboratories would prepare students for laboratory research. The chair used these reasons to encourage instructors to design inquiry-based laboratories.

In the CD department, six laboratory courses were changed. The department chair encouraged changes through his informal communications. Most members were unaware of the changes that were happening.
Community Building Department

The Community Building (CB) department had 45 members. Eighteen members (including three postdoctoral scholars) participated in the change initiative. Four department members changed an upper-division laboratory course to include an authentic research experience. Nine department members changed a single course to include active learning – an introductory lecture for majors with multiple sections. Two department members attended a workshop with funds from the project.

The main focus of the CB department was the introductory lecture course. Before the change initiative, teaching-intensive department members taught this course. Many of these department members retired near the beginning of change. The department chair assigned research-intensive faculty to co-teach the course. These department members recognized FLC participation as a resource for developing this course. The chair intended the co-teaching assignments to lighten the burden of teaching the course and to create a community of department members who could appreciate the difficulty in teaching the introductory course. These participants introduced active learning modules into their lectures.

One of the change initiative leaders became the chair during the change initiative. She continued to rotate instructors in and out of the introductory lecture. Each time she assigned a new instructor to any course, she encouraged them to use research-based instructional practices. She also spoke about and promoted research-based instructional practices in department meetings.

The co-teaching instructors and postdoctoral scholars participated in the change initiative to develop materials for the introductory course. The chair promoted their activities by discussing instructional issues in departmental meetings. However, a member of CB department, who had
not yet taught the introductory course, said she the resources were only available for instructors of the introductory course. The community was supportive of the nine newly assigned members, but may not have addressed the needs of other department members.

Struggling Faculty Learning Community Department

The Struggling FLC (SF) department had 45 members. Eleven members participated in change initiative activities including three postdoctoral scholars. A new curriculum was developed for an introductory laboratory. It was led by a faculty member, a laboratory coordinator, and two postdoctoral scholars. This change would have likely occurred without the support of the change initiative, but the initiative provided the postdoctoral scholars to facilitate changes. The chair spoke positively about the change initiative but had little involvement. One other course changed briefly, but returned to the traditional style when a new department member was assigned to teach it.

The SF department had a learning community focused on the introductory lecture course. The FLC facilitator saw himself as resource of educational information, but not as needing to change his instructional approach. FLC participants had two different perspectives of course goals: content coverage and scientific thinking. The learning community agreed on some shared learning objectives for the course but never made significant changes. This FLC decreased in size after the initial year and eventually stopped meeting. To continue to foster communication, a postdoctoral scholar started a weekly newsletter for lecture and laboratory instructors to provide information on the state of each section. The change initiative participants hoped to restart the FLC in the following years.
The course changes in the SF department were driven by instructor goals and not by the change initiative’s expectation for change. Many department members participated in a learning community that identified some shared learning objectives. However, the learning community did not create any changes.

Discussion: Four Essential Types of Change Activities

Each department experienced different levels of change. Sometimes the same change activity was more successful for one department and less successful in a different department. For example, in both the Community Building department and the Struggling FLC department, an FLC was intended to lead to change in an introductory lecture. However, while the CB department changed the delivery of the course, the SF department’s course remained unchanged. This suggests that the FLC in the SF department may not have addressed at least one of the essential types of change activities. The frameworks of the Eight Stages and CLT can help identify the type of change activity that has not been addressed and suggest potential action that could promote change.

We apply the frameworks to discuss activities (or lack of activities) within the four types of change activities across the departments. First, we describe the change activities of two departments: one with activities that were representative of an Eight Stages approach and one with activities that were representative of a CLT approach (Table 6). Second, we describe a department that faced a challenge within the category of activities and discuss how a change agent may have addressed the challenge using similar actions as the successful departments.
### Table 6: Activities enacted by departments within each change theme.

<table>
<thead>
<tr>
<th>Type of Change Activity</th>
<th>Eight-Stage Leadership Process Activities</th>
<th>Complexity Leadership Theory Activities</th>
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</thead>
<tbody>
<tr>
<td>Create Vision</td>
<td>Chair-Directed Activities</td>
<td>Community Building</td>
</tr>
<tr>
<td></td>
<td>Sense of urgency – Need for</td>
<td>Products environments – FLC</td>
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<tr>
<td></td>
<td>undergraduate research</td>
<td>interactions, postdoctoral scholar</td>
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<tr>
<td></td>
<td>Guiding Coalition – Chair</td>
<td>support</td>
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<tr>
<td></td>
<td>Vision – Inquiry-based laboratories</td>
<td>Articulate the vision – Active</td>
</tr>
<tr>
<td></td>
<td>Productive environments – FLC</td>
<td>learning modules</td>
</tr>
<tr>
<td>Motivate Participants</td>
<td>Chair-Directed Activities</td>
<td>Community Building</td>
</tr>
<tr>
<td></td>
<td>Communicate the vision – Chair</td>
<td>Disruption of patterns and</td>
</tr>
<tr>
<td></td>
<td>personal interactions</td>
<td>Interdependency – Co-assignments</td>
</tr>
<tr>
<td></td>
<td>Broad-based action – Involvement</td>
<td>of instructors</td>
</tr>
<tr>
<td></td>
<td>of many laboratory coordinators</td>
<td>Interactions – Faculty learning</td>
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<tr>
<td></td>
<td>Productive environments – FLC</td>
<td>community meetings</td>
</tr>
<tr>
<td>Build Momentum</td>
<td>Community Building Activities</td>
<td>Lead PI Disciplinary Specialization</td>
</tr>
<tr>
<td></td>
<td>Generate short-term wins – FLC support</td>
<td>Communicate emerging knowledge –</td>
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<tr>
<td></td>
<td>Celebrate wins – Share progress at faculty meetings</td>
<td>Conversations in weekly disciplinary</td>
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<tr>
<td></td>
<td>Produce more change – Cycle instructors in and out of co-teaching assignments</td>
<td>meeting</td>
</tr>
<tr>
<td>Institutionalize Changes</td>
<td>Chair-Directed Activities</td>
<td>Community Building</td>
</tr>
<tr>
<td></td>
<td>Anchor change – Chair continued support</td>
<td>Administrative and Enabling Leaders –</td>
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<tr>
<td></td>
<td></td>
<td>Chair support</td>
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<tr>
<td></td>
<td></td>
<td>Align knowledge with practice – Co-teaching assignments</td>
</tr>
</tbody>
</table>
development is shaped, but not designed by the Enabling or Administrative leadership. The formal leader in CLT creates productive environments (avoids stifling regulations and encourage dissenting opinions) that allow adaptive leadership to develop ideas that provide an articulation of the vision that complements the simple rule.

The Chair Directed (CD) department’s activities correspond to the Eight Stage’s vision creation. The chair and participants acted as the guiding coalition. They recognized a sense of urgency: Department members wanted to hire undergraduate researchers, but undergraduates were underprepared. Second, department members felt that authentic research projects were impractical (too dangerous and time-consuming). The change initiative participants (guiding coalition) identified inquiry-based laboratories as the vision for change that met the sense of urgency by preparing students for research but also considering the practicality of authentic research laboratories.

The Community Building (CB) department participants’ vision development represents a CLT change approach. The change initiative leadership wanted participants to promote student scientific thinking. The CB department members interpreted this goal as a simple rule. The chair encouraged engagement in the FLC in which open communication (productive environment: avoid stifling regulations and encourage dissenting opinions) led the group to articulate a vision around active learning modules. Furthermore, postdoctoral scholars’ participation in the FLC represents a productive environment by relieving some of the burden of developing the active learning course materials. The chair (a change initiative leader) supported the articulated vision because it helped students think like scientists. This vision met both the needs of the participants and the simple rule of the change initiative.
The Isolated Efforts (IE) department struggled to develop a vision. A social subgroup participated in change, but these individuals felt isolated from the department. Rather than being uninterested in participating in instructional change, the other members were interested in a mathematics skills transfer vision for change. According to the two frameworks, these challenges could have either been addressed by creating a powerful guiding coalition to develop the vision (Eight Stage), or by identifying a vision within the simple rule to incorporate the ideas of the department members (CLT).

The Eight Stages approach may have helped the Isolated Efforts (IE) department create vision based on one of their goals for instructional improvement. To encourage department members to identify with the change initiative vision, the change initiative members could have connected this vision with a sense of urgency (such as, preparation for undergraduate research as the CD department did). Furthermore, involving the department chair in a guiding coalition could have compelled others to follow the vision. If the department chair was not willing to join the guiding coalition, the CLT approach to vision development would have been more appropriate. The CLT activities require the department chair not to stifle change and to be open to change. As with the CB department, an activity could have been promoting an open-communication, productive environment between members of the department and interpreting the change initiative’s goal as a simple rule to meet the desires for change of these other members.

The IE department did not have activities that addressed creating a vision. Without a common vision, only a few isolated individuals made changes in their courses. The change agent needed to either identify a guiding coalition (Eight Stages) or promote the creation of new ideas (CLT). The change agent needed to know: Is the chair willing to join a guiding coalition? Could
an issue facing the department become a sense of urgency? Do any structures exist for communicating with all of members of the department? Have new ideas already been developed in interactions that could be used to articulate the vision? The answers to these questions guide the activities that can be used to develop a vision.

Motivate Participants

The Chair Directed (CD) department and the Community Building (CB) department provide examples of activities that addressed the change activity of motivating participants. In contrast, the Struggling FLC (SF) department had individuals attend FLC meetings but many of these members were not motivated to make changes. The Eight Stages motivate change by effectively communicating the vision and empowering broad-based action by providing rewards for changing and resources for change. Motivation is the first event in the CLT change cycle; participants’ motivation is supported via Adaptive leadership through interactions, interdependency and teamwork. New ideas are likely to be developed when these features represent a disruption in patterns.

The Chair Directed (CD) department activities represent an Eight Stages change approach. After the guiding coalition identified the goal of inquiry-based laboratories (as opposed to authentic research experiences), the chair used his formal position to communicate the vision to the multiple laboratory coordinators of the CD department to empower broad-based action. He motivated the laboratory coordinators and faculty members to follow his vision through individual conversations.

According to CLT, the FLC in the Community Building (CB) department motivated change because it was formed during a time of disruption for members, and promoted Adaptive
leadership through *interactions* between *interdependent* members. The *disruption of patterns* was the assignment of co-instructors to a course and support of the postdoctoral scholars. Because instructors were co-teachers, they were *interdependent* upon each other for success. This disruption motivated the instructors to find new solutions to teach the course. The FLC facilitated *interactions* between faculty members to develop and share active learning modules.

The SF department made efforts toward broader motivation through an FLC but many FLC members did not make changes. According to the Eight Stages, the lack of guidance from the facilitating faculty member inhibited change. The facilitator was an information resource not a member of a guiding coalition. This was a missed opportunity for the facilitator to act as a *communicator of the vision and to empower broad-based action* in the FLC. Similar to the Chair Directed (CD) department, the members of the FLC in the SF department felt that their need (to cover a lot of content) could not be addressed with the vision of the FLC (to have students act like scientists). However, unlike the CD department, a *guiding coalition was not developed; a sense of urgency was not identified, a vision was not created or communicated.*

The FLC in the Struggling FLC (SF) department was very similar in structure to the FLC of the Community Building (CB) department, which used a CLT approach to motivate participants. Both FLCs focused on improving introductory lectures in their department. The FLC in the SF department stopped meeting. The SF department FLC provided *interactions* between instructors but *without the disruption of patterns and interdependency* the members were less motivated to make changes in the course. Even after FLC participation dwindled, the SF department continued to promote *interactions* and communication between instructors through a newsletter written by the postdoctoral scholar. However, the motivation would likely be stronger if the instructors were to work *interdependently* on a portion of the course or a
disruption of patterns occurred in some form. The choice to work interdependently could be made by the instructors or by formal leaders; however, a disruption in patterns would likely need to be initiated by formal leaders.

SF participants were not motivated to make changes. Department members committed to meeting in an FLC; a change agent might have directed the FLC through a guiding coalition or strengthened interactions through a disruption of patterns and interdependency of work. The department chair was verbally supportive of change, but had little involvement. A change agent who took either framework’s approach would increase the likelihood of success by increasing the involvement of the chair if possible.

Build Momentum

Building momentum through communication extends change from initial participants to more individuals. The Eight Stages guiding coalition consolidates gains and produces more change by generating and celebrating short-term wins. In CLT, Enabling leadership builds momentum by interpreting emerging events to identify new knowledge and communicating emerging knowledge to spread these changes to new areas. The momentum building activities of the Community Building (CB) department were similar to the Eight Stages. The faculty members of the disciplinary specialization housed within the Lead PI (LPI) department built momentum through a CLT approach. The Chair Directed (CD) and Isolated Effort (IE) departments struggled with building momentum.

The Community Building (CB) department chair generated and celebrated short-term wins and produced more change in untouched portions of the department. The chair was also a change initiative leader and member of the guiding coalition. She generated short-term wins by
providing resources; specifically, she provided support through the faculty learning community. She celebrated short-term wins at faculty meetings by recognizing participants and through personal communications. Furthermore, she produced more change by continuing to assign new faculty members to co-teaching assignments. Momentum was demonstrated by the number of participants involved in the changes to the introductory course and the intention to continue changes in the upper-division laboratory course when a new faculty member was assigned.

The disciplinary specialization within the Lead PI (LPI) department built momentum through weekly faculty meetings. These meetings included discussion about instruction, and faculty members collectively decided on how courses were taught. In addition, when the instructor of the laboratory course made changes, he involved the instructor who would teach the course in the following years. According to CLT, this represents building momentum because interactions (weekly meetings) were used to communicate emerging knowledge (course changes). The initial developer of the course had the opportunity to share his changes with the group. Momentum to change was maintained with the coordination between the two instructors. Within the LPI department, this momentum was contained within the disciplinary specialization.

The Chair Directed (CD) department and the Isolated Efforts (IE) department struggled to build momentum. Change participants did not have mechanisms for sharing their change with the department. Many members of the department were unaware that any change was happening. In the CD department, the chair used personal communications with laboratory coordinators to encourage the use of inquiry-based labs. However, he did not discuss the changes in faculty meetings or provide a mechanism for these individuals to share their progress with the department. (He did not celebrate short-term wins). The CD chair could have adopted the reward
system suggested by the Eight Stages and enacted by the CB chair to build momentum beyond the laboratory coordinators by celebrating wins at faculty meetings.

The Isolated Efforts (IE) department chair was not involved in change; the CLT approach to building momentum enacted by the Lead PI (LPI) department may have been appropriate for the context of the IE department. The IE department had interactions among the faculty members involved directly with change. However, these individuals did not have a mechanism for interacting with the other members of the department. Such interactions could initially have been developed by these members through personal communications or asking for permission to share their work at department-wide events. This communication has the potential to fulfill the role of Enabling leadership by providing a mechanism for communicating emerging knowledge within the department.

To build momentum, it is important to communicate, celebrate, and create more change. If the chair is involved in change, then this communication can be included in departmental meetings and communications. However, if the chair is not involved, then personal communications and meetings among faculty to discuss changes are necessary.

Institutionalize Changes

Institutionalization involves altering structures to support change in the future. In academic departments, structural alterations could mean that the course structure is formally adjusted to include change such as inquiry-based laboratories. It also could mean a change in departmental culture towards valuing the type of work that was promoted by the change initiative. The Eight Stages institutionalize change in the final stage. The guiding coalition anchors new approaches in the culture. In CLT, institutionalizing change is an ongoing process.
The Enabling leaders who also are Administrative leaders modify structures to align with practice.

The five departments made few changes to structures. In addition, the data collected for this study did not indicate if tacit features, such as culture, had changed. Instead, potential institutionalization was indicated by an expectation from participants that the changes would continue in the future or by the transition of a changed course from one instructor to a newly assigned instructor. The Chair Directed (CD) department was partially successful in institutionalizing change. Both the chair and the laboratory coordinators expected that the laboratory courses would continue to be inquiry-based. This institutionalization reflected the Eight Stage approach. The changes are expected to continue because of the anchoring of change through the chair’s formal support. The Community Building (CB) department also expected changes to continue because of the chair’s activities. As an Administrative and Enabling leader, the CB chair aligned practices with the new ideas by continuing to assign co-teachers using faculty meetings to support a vision of research-based instructional practices.

The Lead PI (LPI), Struggling FLC (SF) and Isolated Effort (IE) departments did not show these signs of institutionalizing change. For these three departments, individuals or a small group of individuals made changes. If new instructors were assigned to a changed course, no data sources suggested that the changes would continue. (The course in the disciplinary specialization of the LPI department is an exception to this rule.) In the LPI, SF, and IE department, the chair was aware of change but was not actively involved. The Eight Stage institutionalization phase may be inappropriate for these chairs because they were not involved in the previous stages. Alternatively, in CLT, institutionalization is an ongoing process. Of the departments that struggled with institutionalizing change, the SF’s department chair was the
most aware of change activities. The change initiative participants could have contributed to institutionalization by acting as *Enabling leaders* to communicate new course practices. The chair could then *align practice with these courses*, perhaps by requiring newly assigned instructors to adopt the structure of changes. For all three departments, the lack of involvement of the chair hindered the ability of participants to institutionalize change.
Conclusion: Change Activities and Change Context

Table 7: Common change agent activities (enacted and missed opportunities) within each change theme.

<table>
<thead>
<tr>
<th>Type of Change Activity</th>
<th>Eight-Stage Leadership Process Activities</th>
<th>Complexity Leadership Theory Activities</th>
</tr>
</thead>
</table>
| Create Vision           | • Develop a vision that accomplishes things of value such as developing scientists, preparing undergraduate researchers, or improving mathematics skills  
                          • Identify specific course changes to achieve the vision, such as inquiry-based laboratories or authentic research experiences  
                          • Include the chair and other informal and formal department leaders (course coordinators, curriculum committee members) in the vision development and promotion  
                          • Use new ideas that fit the simple message to articulate the details of a vision  
                          • Develop expectations of and opportunities for open, judgment-free discussions at faculty meetings or other departmental gatherings  
                          • Remove typical workload or administrative burdens from groups – provide support via post doctoral scholar |
| Motivate Participants   | • Promote the vision and reward efforts through personal interactions and/or act as role models by piloting course changes in change leaders’ classrooms  
                          • Provide resources such as money, time, and/or post doctoral scholar support for initial changes  
                          • Use a simple message (e.g., students as scientists) to guide new ideas  
                          • Create formal or informal groups of faculty and staff that have a reason to work together, such as co-teaching assignments and faculty learning communities  
                          • Support teamwork by removing other workloads or providing postdoctoral scholar support |
| Build Momentum          | • Transform initial changes into short-term wins that are celebrated publicly -- faculty meetings, department newsletters, etc.  
                          • Continue to identify new areas or new individuals who can be engaged in change (e.g., assign new instructors to changed courses)  
                          • Enlist support of formal leaders, if possible, to endorse new ideas.  
                          • Frame discussions about emerging ideas within the simple message  
                          • Share emerging ideas broadly – faculty meetings, department newsletters, etc.  
                          • Be involved in informal interactions with group members behind the scenes |
| Institutionalize Changes| • Engage formal and informal leaders to change structures, such as classroom design, course assignments, or instructional expectations, to support the vision.  
                          • Engage formal and informal leaders to change structures, such as classroom design, course assignments, or instructional expectations, to support the vision. |
We have discussed departmental change from the perspective of two change frameworks. These two frameworks identify individual roles and actions within four types of essential change activities: create vision, motivate participants, build momentum, and institutionalize change.

Often the roles of individuals are different across change approaches. For example, the activities for motivating participants occur first in the Complexity Leadership Theory framework and second in the Eight Stages. In CLT, motivation is based on the interactivity and interdependency of individuals. In the Eight Stages, motivation occurs through the allocation of rewards and resources by the formal leaders. Conversely, sometimes the features of these activities are similar for both approaches. For example, the formal leadership role in institutionalizing change in both approaches requires leaders to adjust structures within the environment to support changes.

Without achieving the goals of these four categories, change initiatives are likely to fail. Fortunately, by using multiple perspectives, a change agent can purposefully select appropriate change activities to achieve success in these categories. Contextual features help identify which change activity is the most appropriate within the departmental environment. These two specific examples of change frameworks help change agents consider change from a prescribed and emergent perspective. This familiarity provides change agents with multiple tools for promoting change. Moreover, change agents can also explore other theories of change to identify mechanisms and specific activities that complement their context (e.g., Borrego & Henderson, 2014; Kezar, 2013).

The case studies’ discussion highlighted the similarities and differences in the change categories within the context of departmental change. Common activities for creating vision, motivating participants, building momentum, and institutionalizing change, both those enacted and those judged as missed opportunities, are summarized in Table 7. The Eight Stages identifies
problems and solutions within the four categories by focusing on the role of a powerful guiding coalition. This coalition needs to be organized, dedicated, and consistent in guiding change from vision development to institutionalizing change. This focus on formal leaders within a guiding coalition can overlook the power of connections and innovation from the other departmental members. In addition, progress within the Eight Stages is susceptible to abandonment if a turnover in departmental leadership occurs. Complexity Leadership Theory suggests that departmental members should be more engaged in the change process. Specifically, change should start with motivation to change through disruption of events and interdependency between individuals. However, change agents who use the CLT approach may be tempted to overlook the important role of formal leaders. These leaders are in the best position to create an environment that supports interactions and be open to the development of new ideas.

Categorizing the types of change activities can help a change agent identify key players and plan actions to guide the change process. In addition, the categories can be used to diagnose challenges to change and to suggest potential solutions. These case studies provide specific examples of key players, actions, and activities that might be used in a STEM department to promote instructional change. Through familiarity with multiple perspectives on change, a change agent can plan change that matches the context of his or her department and use multiple tools to increase the likelihood of successful change efforts.
References


Quardokus, K. (2014). *Instructional Change in Academic Departments: An Analysis from the Perspective of Two Environment-Focused Change Strategies* Doctoral dissertation, Western Michigan University, Kalamazoo


