

# Aspects that influence curricular change capacity: characterizing the transferability, openness, and literacy of individual changemakers

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**Abstract—** In this work-in-progress paper, we present a framework for developing an individual's capacity to engage in curricular culture change. It is part of a larger project that looks at curricular change through a cultural lens by analyzing cross-institutional curricular collaborations. An individual's capacity depends on three aspects: transferability (the presence of a testable hypothesis for transferring a curricular element across cultures), openness (the willingness and ability to personally pay the "cost" of running that experiment), and literacy (the ability to make sense of one or both curricular cultures involved). These three aspects combine into eight possible states, and individuals in each state demonstrate different responses to opportunities for curricular culture change. Developing this framework gives us a way to think about potential interventions that can help individuals increase their capacity for this sort of change work.

**Keywords—** *faculty; cross-institutional collaboration; changemaker; curricular change; curricular culture*

## I. INTRODUCTION

In order for the engineering education community to build its collective capacity for curricular change, we must investigate how to develop curricular change capacity in individuals. This work-in-progress paper is part of a larger project that frames curriculum as culture, and thus curricular change as culture change. These preliminary theories were generated from a pilot data corpus of interviews and observations from curricular exchange partnerships. These partnerships involved faculty from different institutions interacting over an extended period of time to transfer curricular insights across institutions, with both institutions serving simultaneously as "origin" and "destination" cultures for the transfers. One of our facets of investigation concerns how individual faculty involved in these change efforts build their capacities for this sort of curricular culture change work.

In choosing to frame curricular change capacity as both individual and cultural, we were influenced by the related conceptual framings of "change knowledge" and "changemakers." Change knowledge consists of assumptions about the target system to be changed and hypotheses on how one might work to change it [1]. Changemakers are people who apply their change knowledge [2]. Both concepts imply that the nature of a systems change is situated in the system to be changed, that it is influenced by the abilities of individuals, and

that individuals can develop their abilities to change particular systems. We bring these concepts into the curricular change context by explicitly presenting curricular environments as cultures. The development of individual changemakers involves three capacities relevant to cultural change: transferability, openness, and literacy. Presenting these capacities in the context of individual development rather than team or society-level development allows it to be used for individuals regardless of the environment they are in and the skills and attitudes of those around them. The solitary assistant professor with a big idea but hostile colleagues, the tight-knit teaching team with significant grant funding and administrative backing, and the aspiring graduate student with few resources can all be viewed through this developmental framework.

In this paper, we begin by describing the three aspects developed by curricular culture changemakers: transferability, openness, and literacy. We describe the aspects independently first, then discuss how they interact and mutually reinforce each other. Next, we combine the three aspects into eight distinct states of curricular change capacity. For instance, one person might have openness but not literacy and transferability, while another might have literacy and transferability, but not openness. We discuss how each state generates a unique response to various curricular culture change opportunities. Finally, we discuss this framework's potential for understanding the developmental paths of changemakers and designing interventions to assist them.

## II. THREE ASPECTS

### A. Curricular culture transferability

The aspect of transferability refers to whether the changemaker has a specific cross-cultural hypothesis they want to test about curricular change. This hypothesis involves transferring a particular element from one curricular culture to another. For example, a professor might recognize that another college does not have prerequisites for several of its upper level classes to allow students from other disciplines to enroll. That professor might hypothesize that dropping prerequisites for their upper level course will lead to more cross-disciplinary enrollment without reducing the pass rate. This hypothesis may be true or false. The point is that it is testable, and this test in one curricular culture is inspired by an element of another

curricular culture. Transferability describes a specific approach to envisioning translations of curricular culture elements from one context to another.

In articulating this aspect, we draw from two places. One is the work of Sarasvathy, who talks about how entrepreneurs explore unknown contexts by constantly running small experiments focused primarily on learning, where failure is expected and the cost of failure is an affordable loss [3]. These experiments gradually build a more complete picture of what will and will not work in a particular context, in this case the target curricular culture. The other is Westerlund, who describes this emergent picture as the "design space," where designers move from a large range of possible solutions to a smaller range of increasingly refined ones based on prototypes and research [4]. Using this language, changemakers with the transferability aspect have small affordable-loss experiments for exploring the particular design space of the curricular culture changes they desire.

These small experiments need not be actually run; the act of envisioning them in and of itself can sometimes clarify that testing them is not the desired way forward. These experiments allow for affirmation (is this right for us?) and moving towards action (i.e. ideation before prototyping in design thinking). The hypotheses should be crafted such that falsifying them is also considered a success; e.g. determining what we don't want to transfer, who we are not, what won't work for us.

#### *B. Curricular culture openness*

The aspect of openness refers to the changemaker's personal willingness and ability to pay the personal "cost" (time, energy, reputation, etc.) that a desired curricular culture change will require of them. For instance, engineering educators often say that training in communication, teamwork, and ethics are valuable, but may be reluctant to drop technical lectures from their course plans in order to make room for those activities. To them, the cost of losing that technical content is not a price they are willing to pay.

This cost may be both lower and higher than originally anticipated, and/or may be based on a misunderstanding. To continue the above example, incorporating communication, teamwork, and ethics may not require dropping technical content; it is possible to learn technical content in teams, or to show how misapplication of technical content could lead to an unethical situation. Nevertheless, there are tradeoffs that do place more work on faculty engaging in these kinds of curricular change activities, and this labor (cognitive, emotional, etc.) does constitute a cost.

Because these costs can often be difficult to shoulder, faculty may struggle with openness for multiple reasons. Faculty may have a "competing commitment" [5], such as preserving the technical legitimacy of their course, the perceived technical competence of their students, a reputation for rigor in their department, and so forth. These competing commitments make them less open – less willing to personally consider and engage with – curricular changes that might endanger other facets of their performance that they value. These include things like "I cannot spend more prep time on courses because I am already not spending enough time with

my kids" or "I do not have the bandwidth to try something new in my teaching if I am to write enough papers to get tenure in two years."

#### *C. Curricular culture literacy*

The aspect of literacy involves the ability to make sense of both origin and destination curricular cultures in the same way that members of those cultures do. In articulating literacy with respect to curricular cultures, we draw on Hirsch, who first used "cultural literacy" to refer to the body of knowledge an educated person might allude to in conversation [6]. For instance, an American would know that "O say can you see" refers to the opening lines of the USA's national anthem, catch references to "I have a dream" as pointing to Martin Luther King, Jr.'s famous civil rights speech, and using these and similar references be able to decode phrases and behaviors in U.S. culture.

Just as linguistic literacy must always be tied to a particular language (one is not just "literate," but rather "literate in Brazilian Portuguese"), cultural literacy is tied to a particular culture. Just as it is possible to have varying levels of literacy in different human languages (highly literate in Tamil, but less so in Korean), people may have high levels of curricular culture literacy in one setting (often their home institution) and lower levels in others. For example, think of the disorientation of the new PhD graduate whose entire educational experience has been in large, research-focused universities the first time they visit a small teaching college; the classroom sizes, behaviors, and assumptions about teaching, learning, and student relationships are dramatically different.

Hirsch's formulation is primarily epistemological, but we also extend cultural literacy beyond this original conception of "educated" knowledge to explicitly include engaging in culturally-appropriate behaviors – the outward physical performance of that cultural literacy, so to speak. Curricular culture literacy means understanding the assumptions a culture makes about meaning, but does not necessitate the embodiment of those assumptions. Rather, it means that the literate person understands how their chosen embodiment "reads" in the current culture. For instance, a male professor in America may want to adopt a more nurturing role; if he knows this works against his existing institution's curricular culture, he can use his cultural literacy to better position himself to make that happen.

#### *D. Relationships between the three aspects*

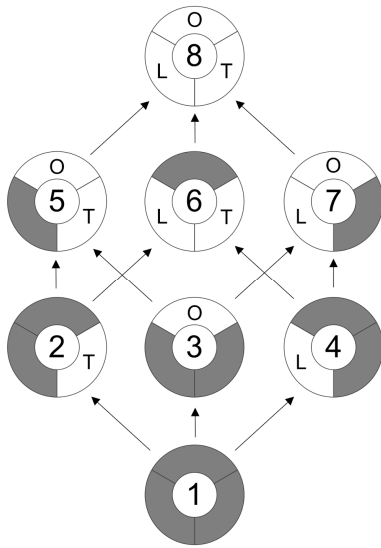
The three aspects of transferability, openness, and literacy contrast and interact with each other in various ways. For instance, transferability is concerned with testing a hypothesis across cultures, and a negative response is still considered beneficial and not a sign of the aspect's absence. However, literacy is concerned with working within a culture, and a changemaker with literacy should be able to correctly guess how those from a particular curricular culture will interpret something. Greater literacy can aid transferability by informing the hypotheses generated; experiments with transferability can increase literacy by making-visible cultural elements that might otherwise become invisible and taken for granted.

Similarly, the experiments that determine the presence of transferability will all require various kinds of resources (time, money, space, skill, etc.) to execute. This connects with the aspect of openness, which is the changemaker's willingness to pay that cost. Concerns about cost may prematurely constrain the design space for transferability. Finally, literacy can help form accurate estimates of how much a curricular change will personally cost a given changemaker, which can affect their level of openness.

### III. COMBINING THE ASPECTS INTO AN EIGHT-STATE FRAMEWORK

Each of these three aspects can either be present or absent in a changemaker's approach. This means that there are  $2^3 = 8$  possible states that a changemaker can be in with respect to curricular culture change. Our pilot data suggests that the eight states link into a series of pathways. We have found this preliminary model helpful in describing an individual's growth in capacity for curricular culture change. Figure 1 and Table 1 below work together to describe this model.

Figure 1 below depicts these eight states and the paths that a person might take from one to another. The numbers in the diagram below correspond to states that will be described later in this section. The model hypothesizes that a person only adds one aspect at a time; even if it appears that a person moves from State 3 to State 8 in the course of a conversation, we hypothesize that he/she must at least momentarily pass through State 5 or State 7 along the way. Future work might test this hypothesis.



**Figure 1 - The eight states and pathways between them**

Table 1 below describes the eight states individually. For each state, we specify which of the three aspects are present (cultural transferability, openness, and literacy) and express the mindset of individuals in that state with a descriptive phrase. Finally, since our pilot dataset IRB does not allow us to quote

verbatim responses, we provide a synthesized sample quote that is illustrative of the kinds of things people in this state might say. The numbers beside each state match the numbers in Figure 1.

TABLE I. DESCRIPTIONS OF THE EIGHT STATES

State	Transfer.	Openness	Literacy	Description
1	No testable hypothesis	Not worth my effort	Makes no sense, or miscoded	Apathy/Disinterest: There's nothing here.
2	Specific testable hypothesis	Not worth my effort	Makes no sense, or miscoded	Sees possibility, skeptical of benefit: We could do that, but what's the point?
3	No testable hypothesis	I will do whatever it takes	Makes no sense, or miscoded	Frustration/desperation with no clear next steps: We have to change, but how?
4	No testable hypothesis	Not worth my effort	Correct in-culture meaning	Appreciation from a distance: That's nice for you, but we can't do that.
5	Specific testable hypothesis	I will do whatever it takes	Makes no sense, or miscoded	Uninformed enthusiasm: I've got it! Let's make it happen!
6	Specific testable hypothesis	Not worth my effort	Correct in-culture meaning	Conscious opting-out: We could benefit from this, but will choose something else.
7	No testable hypothesis	I will do whatever it takes	Correct in-culture meaning	Informed and motivated, but no clear action plan: Where do I start, what do I do?
8	Specific testable hypothesis	I will do whatever it takes	Correct in-culture meaning	Informed and engaged: I'm ready to prototype and learn along the way.

### IV. DISCUSSION AND CONCLUSION

The definitions and names of the three aspects we have just articulated are still in formation. However, articulating them as separate and interacting aspects allows for the assembly of the eight-state framework. This framework, in turn, suggests possible developmental pathways and interventions that might be effective in spurring changemakers to move from one state to another. Our current data only shows an upwards progression through the eight states; future work may examine whether regression is possible, and how the model may need to be adjusted to account for it if so.

To give a more concrete example: someone in State 5 (uninformed enthusiasm) has transferability and openness, but low literacy. Left unchecked, this may lead to misapplication of surface-level features, followed by confusion over why this did not produce the desired change. An appropriate intervention might address the literacy aspect, probing into the changemaker's interpretation and rationale for choosing which features to adopt. This sort of engagement may focus on exposing specific misinterpretations, which may in turn require intensive, customized individual or small-group work.

However, someone in State 3 (frustration/desperation) does not have transferability or literacy, but does have openness. The lack of transferability means a lack of concrete hypotheses to test as a means of moving forward; the lack of literacy may make it more difficult to generate appropriate hypotheses. Offering scaffolding in the form of a workshop may be an appropriate intervention for a changemaker in this state.

Workshops can deliver more generalizable content and structured experiments for individuals to engage in, which would address the literacy and transferability aspects, respectively.

This work-in-progress framework suggests that changemakers have a varied set of needs that do not remain the same as they progress from one state to another. This in turn implies that different interventions are needed for different people at different points in time. At least when it comes to curricular culture, changemaking is a complex capacity with a complex developmental pathway. There is no one-size-fits-all intervention that will help all changemakers progress regardless of state. The eight-state framework and the three aspects can give us a way to think about getting “un-stuck” as we develop our capacities as curricular culture changemakers and supporters of changemakers.

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