



# Systemic Tensions in the MOOC Design Cycle: An Activity Systems Analysis upon Implementing edX for Latin America and the Caribbean

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RESEARCH ARTICLE



## ABSTRACT

This report presents the activity systems analysis of the general MOOC design process adopted by a multidisciplinary team for delivering edX courses to Latin America and the Caribbean (LAC). This report builds on Freire's (2020) exploratory case study, which applied work-based learning theory and activity systems theory to determine whether and how 20 participants selected from the Hemispheric Development Fund's MOOC design team (HDFx) experienced work-based learning through their collaboration during the MOOC program's initial professionalization period. Activity systems models are developed to identify systemic tensions for each of the five phases in the MOOC design cycle: Needs Assessment, Instructional Design, Production, Implementation, and Evaluation. Such contradictions are further analyzed to formulate three main system-wide tensions that acted as triggers for the work-based learning reported by participants: 1) skill gaps for implementing the edX platform, 2) edX's limited technological affordances, and 3) organizational structures inhibiting multidisciplinary collaboration among participants and limiting the professionalization of the HDFx MOOC program. The report concludes by integrating the theoretical underpinnings of the case study with its four primary findings.

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This analysis expands on Freire's (2020) exploratory case study, which found experiences of work-based learning in the reports by 20 multidisciplinary practitioners following the launch of a MOOC program at the *Hemispheric Development Fund* (HDFx). The study applied work-based learning theory (Dewey, 1933; Lewin, 1947; Marsick & Watkins, 1990) and activity systems theory (Vygotsky, 1978; Leontiev, 1981; Engeström, 1987) in order to describe the multidisciplinary collaborations needed for delivering edX MOOCs to Latin America and the Caribbean (LAC). This report focuses on the activity systems analysis of the five phases in the MOOC design cycle conducted for Freire (2020), as a means to identify the systemic tensions that challenged participants to learn while engaged at work—both within each phase as well as across the entire design cycle. One principal research question and three secondary questions guided the investigation:

1. What systemic tensions emerge through the five phases of the MOOC design cycle at the Hemispheric Development Fund? And how, if at all, do such tensions contribute to the work-based learning reported by members of the HDFx MOOC design team, with regard to:
  - a. The knowledge, skills, and/or behaviors that participants believe they need to master in order to be successful in their jobs?
  - b. The organizational, technological, and/or pedagogical conditions that frame the HDFx activity setting and the multidisciplinary collaboration among participants?
  - c. Future challenges and opportunities that participants expect having to face upon implementing the edX MOOC platform for delivering training and professional development courses to LAC?

Both the activity setting and the study participants received fictional names to preserve the study's confidentiality. The study used in-depth participant interviews, a demographic survey, field observation, and document analysis. **Table 1** organizes the 20 study participants by professional discipline and by the factors that contributed to their learning while on the job (Freire, 2020). The participant population included professionals at the intersection of information and communications technology (ICT) with adult education, divided evenly into the following five disciplines: subject matter experts, instructional designers, administrative assistants, platform technicians, and media producers. Research data was organized, coded, and evaluated according to the constant comparative method (Corbin & Strauss, 2008; Strauss & Corbin, 1998), and then analyzed using Engeström's (1987) activity systems analysis framework in order to identify the activity systems models of each of the five phases in the MOOC design cycle adopted by the HDFx program.

## ACTIVITY SYSTEM MODELS AND SYSTEMIC TENSIONS ACROSS FIVE PHASES OF THE MOOC DESIGN CYCLE

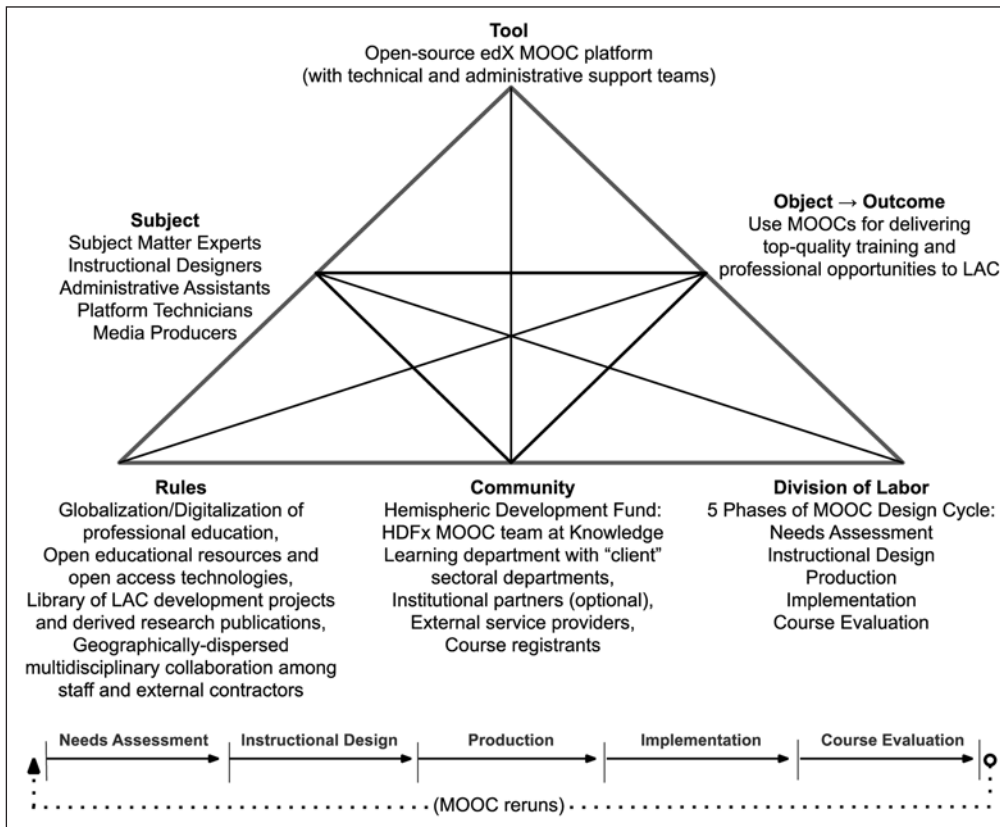
This report maps the activity systems model for the general HDFx MOOC design process (see **Figure 1**) and identifies the systemic tensions for each of these five phases in the MOOC design cycle: Needs Assessment (**Figure 2**), Instructional Design (**Figure 3**), Production (**Figure 4**), Implementation (**Figure 5**), and Course Evaluation (**Figure 6**). The activity systems analysis culminates with the identification of the system-wide tensions that acted as triggers for the work-based learning experiences reported by participants (see **Figure 7**).

### PHASE ONE: NEEDS ASSESSMENT SYSTEMIC TENSIONS

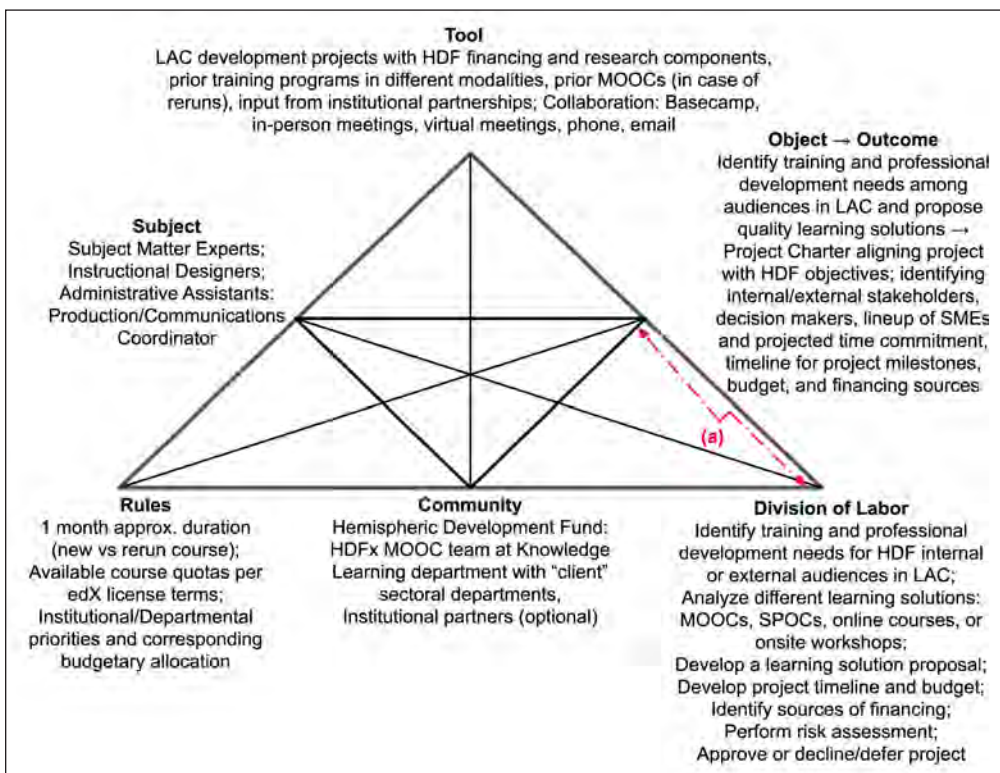
**Figure 2** depicts the systemic tensions identified by study participants during the Needs Assessment phase. This phase considers a project's alignment with institutional and departmental goals, weighs LAC professional development needs vis-à-vis different learning solutions, outlines the anticipated time commitment for key stakeholders, and sets a timeline and budget. The outcome from this phase incorporates all these elements into a master document in the form of a project charter. Tension (a) illuminates a clash between the division of labor and the object/outcome components of the Needs Assessment activity system model,

**Table 1** Findings Chart (Freire, 2020).

| PROFESSIONAL DISCIPLINES                                | PLATFORM TECHNICIANS            | INSTRUCTIONAL DESIGNERS       | ADMINISTRATIVE ASSISTANTS     | SUBJECT MATTER EXPERTS   | MEDIA PRODUCERS              | TOTALS PERCENT-AGE |
|---|---------------------------------|-------------------------------|-------------------------------|--------------------------|------------------------------|--------------------|
| PARTICIPANTS  | ALBERTO PATRICIO EMILIA MARCELA | CELIA XIOMARA BEATRIZ SILVANA | VALERIA LUISA DANIEL CRISTINA | FELIPE KEVIN KARLA SIMÓN | VÍCTOR PAMELA TERESA RICARDO |                    |
| <b>FINDING</b>  |                                 |                               |                               |                          |                              |                    |
| Work-based Learning via Labor-integrated Activities     | X                               | X                             | X                             | X                        | X                            | 20                 |
| Developing Educational Resources or Learning Activities | X                               | X                             | X                             | X                        | X                            | 16                 |
| Need for Improving Organizational Processes             | X                               | X                             | X                             | X                        | X                            | 17                 |
| Facing Constant Technological Upgrades                  | X                               | X                             | X                             | X                        | X                            | 15                 |
|   |                                 |                               |                               |                          |                              | 100%               |
|   |                                 |                               |                               |                          |                              | 80%                |
|   |                                 |                               |                               |                          |                              | 85%                |
|   |                                 |                               |                               |                          |                              | 75%                |



**Figure 1** Activity system model (Engeström, 1987) depicting the five-phase HDFx MOOC design cycle (adapted from HDF internal documents, 2015).



**Figure 2** Activity systems analysis: Needs Assessment tensions.

reflecting the varying levels of compliance by key stakeholders with regard to their assigned responsibilities and anticipated time commitment for the duration of the MOOC development project.

Participants reported uneven adherence to the terms of the project charter, especially by the subject matter experts appointed by the HDF “client” departments or their institutional partners with the responsibility to provide the course content. For example, participants reported instances of reading materials not being proofread or approved in time, which then

delayed the platform configuration schedule or created complications with the production and post-production of instructional videos, among other system contradictions. Tension (a), thus, illuminated significant aspects beyond the initial planning phase, demonstrating the close interdependence among the various phases within the MOOC design cycle.

## PHASE TWO: INSTRUCTIONAL DESIGN SYSTEMIC TENSIONS

Figure 3 illustrates the systemic tensions identified during the instructional design phase of the HDFx MOOC design cycle. The project charter outcome from the preceding Needs Assessment phase went on to become the main input or tool for organizing the main collaborations and activities of this system. This phase included activities geared towards defining the course’s learning objectives, developing a detailed course structure with supporting educational resources and learning sequences, and defining an assessment strategy. Ultimately, the object of this activity system was to develop a top-quality instructional design proposal bound by the predetermined text-based, media-based instructional functionality of the edX platform and by the typical structure of a MOOC following 6 to 8 weekly modules. That outcome will in turn trigger the production of educational resources and the platform configuration in the next phase of the MOOC design cycle.

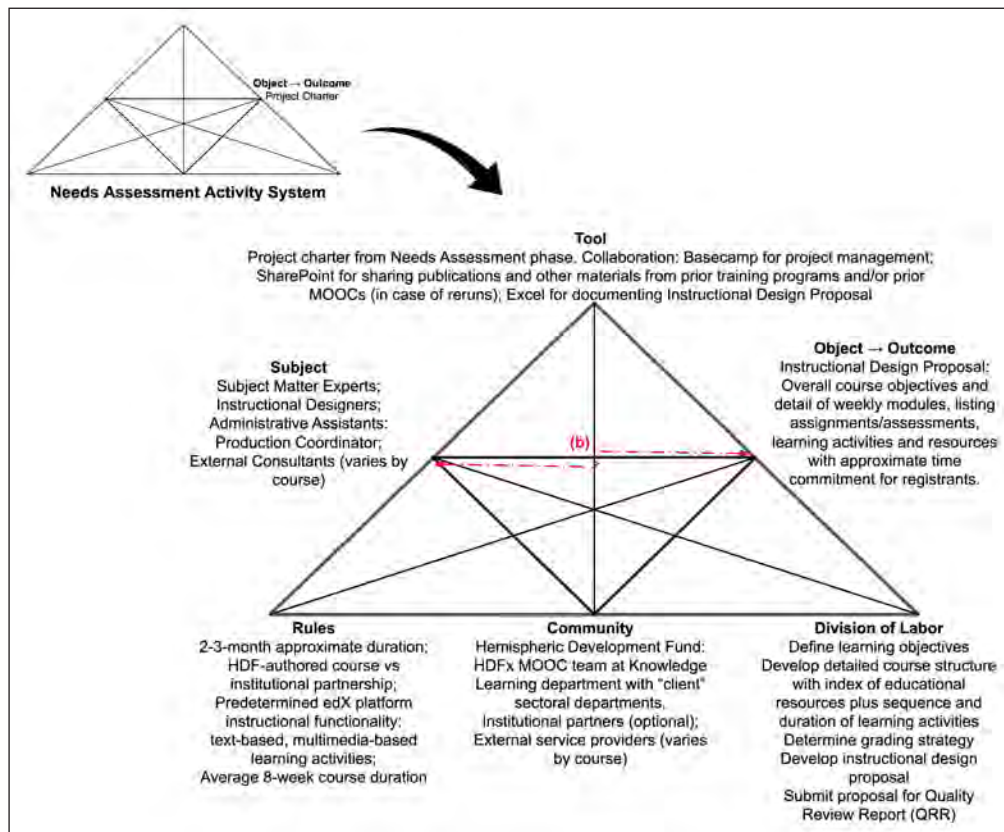


Figure 3 Activity systems analysis: Instructional Design tensions.

Tension (b), depicted by a clashing line between the subject and object/outcome components of the instructional design activity system model, reflected the often-complicated negotiation between subject matter experts and instructional designers as they set out to fulfill the main object of this activity system—an instructional design proposal for a MOOC or SPOC. Subject matter experts, for example, emphasized the importance of distilling large amounts of information on a given field to their most basic and common form in order to make it relevant for the massive number of MOOC registrants. Instructional designers, on the other hand, prioritized the translation of that content into custom learning resources and practical learning activities that may be mapped and evaluated with respect to the course’s overall learning objectives. Ultimately, Tension (b) illuminated the trial-and-error and iterative pathways taken by the participants as they gained practical knowledge in the preparation of educational resources or learning activities for the edX platform.

### PHASE THREE: PRODUCTION SYSTEMIC TENSIONS

Figure 4 maps the tensions reported during the production activity system, the third and most laborious phase from the HDFx MOOC design cycle. As represented by the tool component, the instructional design proposal elaborated in the previous phase provided the main input for the production activity system, outlining the various educational resources and learning activities required as well as the structure for all course materials being uploaded to the edX platform. In turn, the professional coda for each of the participating disciplines exerted a determinant role throughout this phase. For instance, the rules bounding the generation of educational videos responded to the preferred practices of video professionals and technical standards of their industry, in conjunction with the norms of subject matter experts as knowledge providers, and administrative assistants as coordinators between the two antecedent disciplines.

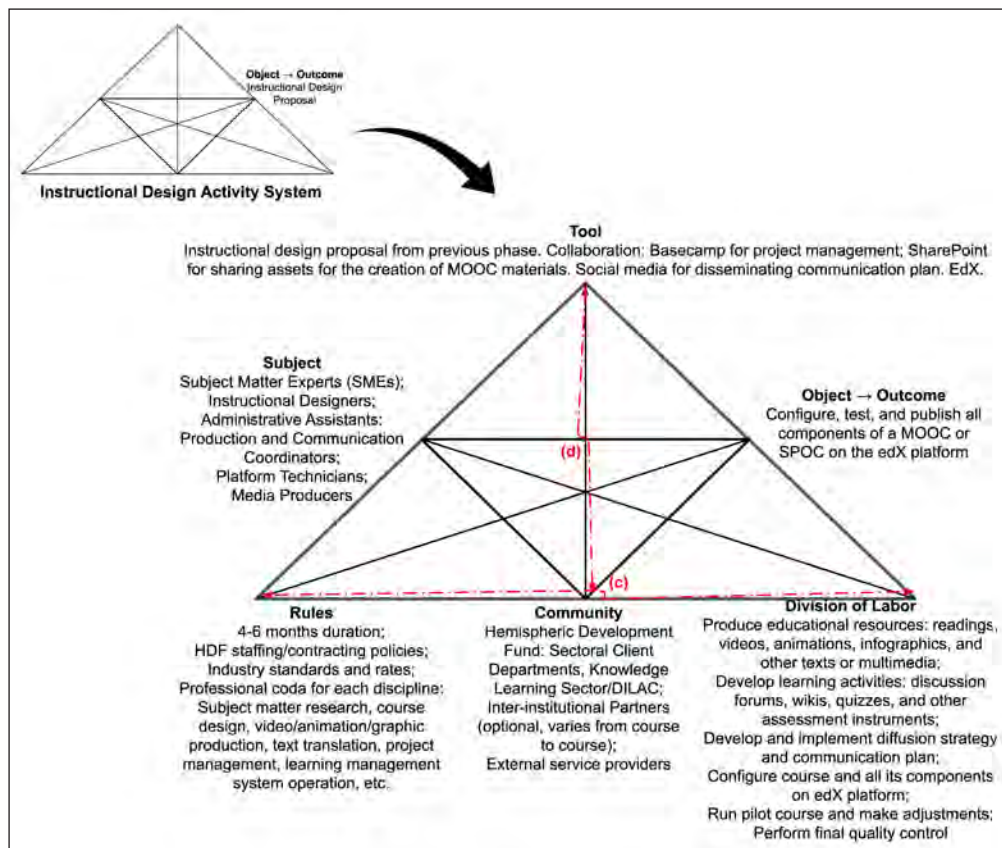


Figure 4 Activity systems analysis: Production tensions.

Depicted by a clashing line between the rules and division of labor components in the production activity system model, Tension (c) identified the cumbersome multidisciplinary collaborations and related expensive contracting solutions necessary for the production of educational resources and learning activities for the edX platform. Among these, the hiring of video professionals and the associated management of video production and post-production processes were consistently reported as the most expensive and time-consuming during this phase. Tension (c) also corroborated the need to improve organizational processes as the most important contextual condition affecting multidisciplinary collaboration at the HDFx MOOC program.

Tension (d), depicted by a clash between the tool and community components of the production activity system model, responded to the challenges faced by participants regarding constant developments in the technological tools they use. For instance, while online applications played an indispensable role enabling multidisciplinary collaboration among participants, the inconsistent adoption of such tools by different team members proved to be an area of concern for many. The upkeep of the edX platform itself was identified as an area of concern, given its constant upgrading demands. This, in turn, increased the learning pressures among members of the HDFx team, especially for platform technicians who configure the platform. Overall, the themes illuminated by Tension (d) remarked on the importance of improving organizational processes by better integrating tools for multidisciplinary collaboration. Similarly,

Tension (d) further emphasized the demand for learning at work in response to constant technological changes.

## PHASE FOUR: IMPLEMENTATION SYSTEMIC TENSIONS

Figure 5 depicts Tension (e) within the Implementation activity system, corresponding to the period in which a MOOC is “live” or “in session” on the edX platform. A clashing line between the community and tool components points to the course registrants or end users, alongside the HDFx MOOC support team and the platform itself. During any given course, these elements could eventually get in conflict with each other. For example, a feature of the edX platform that received repeated mentions as an area in need of integral improvement was the discussion forums. Given the massive number of registrants participating in these community boards, the moderation of such forums—or lack thereof—was quickly identified as problematic.

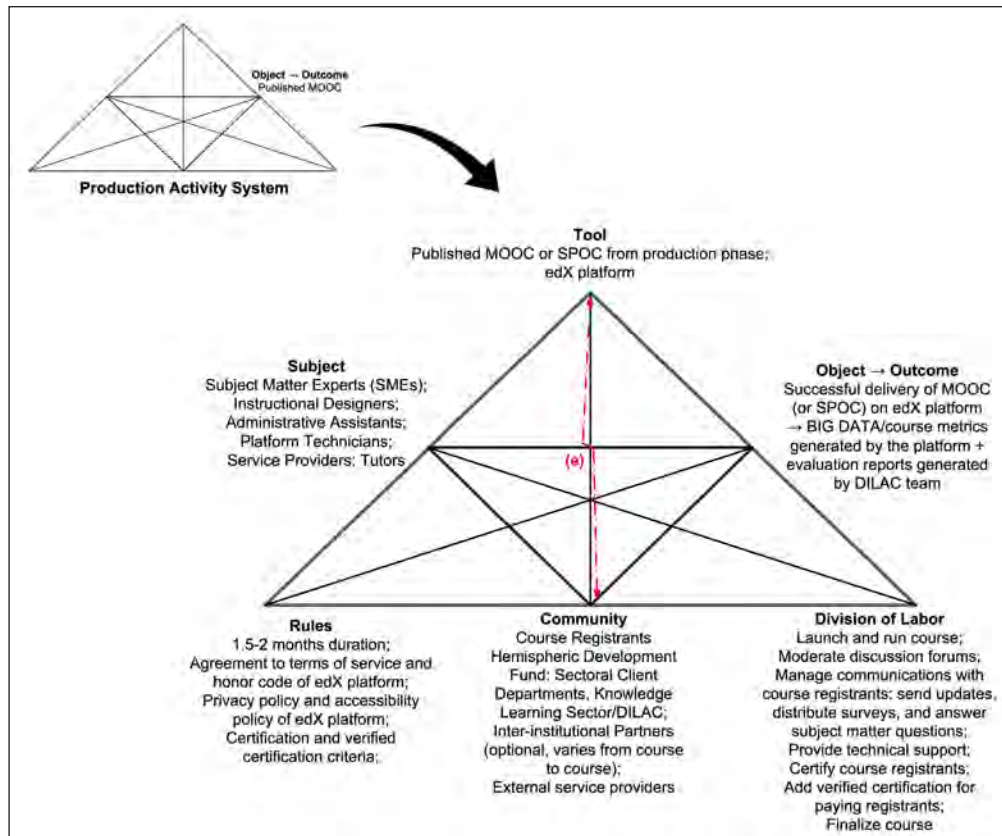


Figure 5 Activity systems analysis: Implementation tensions.

Naturally, the ultimate object of the Implementation activity system is to deliver a high-quality MOOC for registrants as determined by a variety of metrics about the course. Tension (e) emphasized the learning pressures faced by participants in connection to the production and administration of learning activities, such as discussion forums. In sum, Tension (e) recognized the participants’ preoccupation with the provision of technical and content support for course registrants in response to constant upgrades in the functionality of the edX platform.

## PHASE FIVE: EVALUATION SYSTEMIC TENSIONS

Figure 6 represents the systemic tensions during Evaluation, the final phase in the MOOC design cycle. In this sense, end of term assessments aimed mainly at determining the number of registrants who met the minimum 65% of the course requirements to qualify for a certificate of completion and the number of registrants who paid the \$25 fee for a verified certificate of completion. Additionally, this phase involved processing different kinds of registrant surveys and system reports about their interaction with the platform, looking for direct user feedback and/or big data clues for optimizing subsequent course editions.

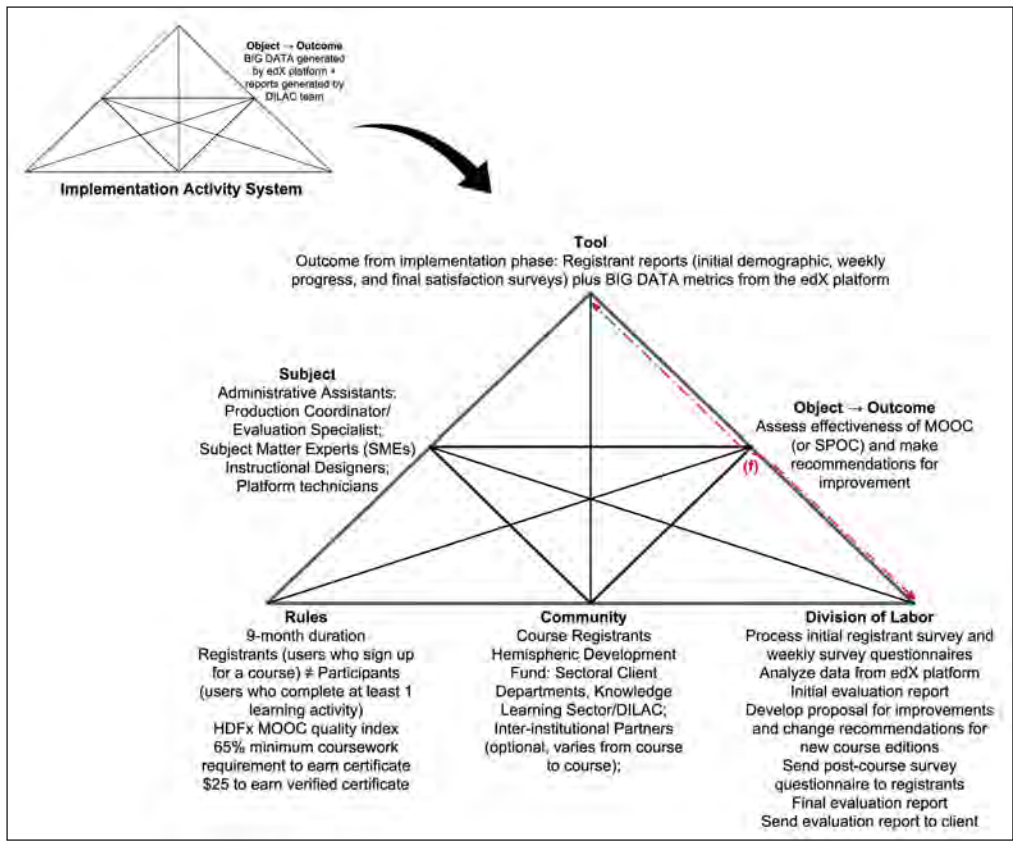


Figure 6 Activity systems analysis: Evaluation.

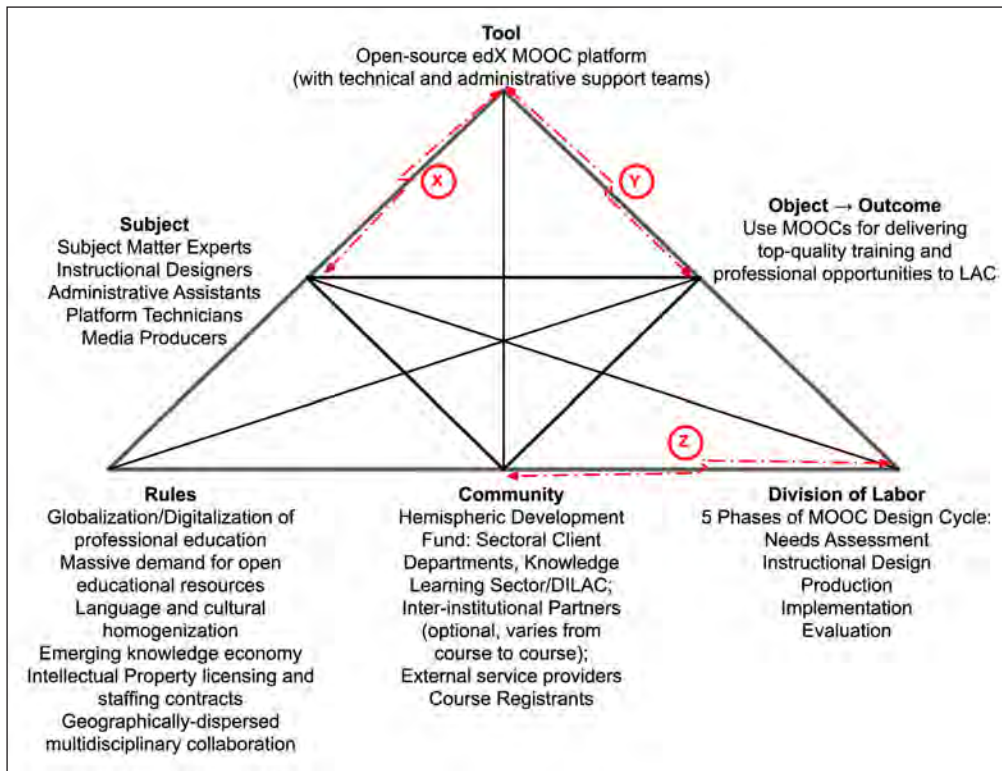
Tension (f) illustrates a clash between the tool and division of labor components within the Evaluation activity system. This systemic tension documented the absence of a data analyst in the HDFx team that would support lines of MOOC research and development via big data analytics. As a result, the brunt of the statistics work for the HDFx MOOC program was carried out by a single team member, whose competing functions were divided between administrative assistance, production coordination and course evaluation. Ultimately, this was recognized as a limitation for the development of new insights that would improve the planning, execution, and delivery of future courses. As such, the HDFx program eventually added a big data analyst and an education technologist to its ranks—although the timeline for this study did not allow for the full documentation of those and other organizational changes.

**ACTIVITY SYSTEMS ANALYSIS: SYSTEM-WIDE TENSIONS**

Tensions (a-f) resulting from the individual activity systems analysis of each of the five phases in the MOOC design cycle could, in turn, be synthesized into the following activity systems model of the HDFx MOOC program, integrated with its corresponding system-wide tensions, as illustrated in *Figure 7*.

- Tension X, depicting a clash between the subject and tool components of the HDFx MOOC program system, addressed challenges of professional practice deriving in learning pressures for members of the HDFx team in relation to the adoption of the edX platform for the creation and delivery of MOOCs for LAC. As such, it identified gaps of practical knowledge or skills reported by subject matter experts, instructional designers, administrative assistants, media producers, and platform technicians through their multidisciplinary collaborations.
- Tension Y, depicting a clash between the tool and object/outcome system components, documented the technical and/or pedagogical challenges with the functionality of the edX platform and contingent MOOC-based modalities of instruction that were identified by participants as obstacles hindering the HDFx program’s primary objective of using MOOCs for delivering top-quality training and professional development opportunities for LAC.





**Figure 7** Activity systems analysis: HDFx MOOC program tensions.

- Tension Z, depicting a clash between the community and division of labor system components, captured the political and institutional conditions at play at the HDF that support or hinder participants’ work performance and multidisciplinary collaborations. Thus, it reflected contextual factors impacting the HDFx MOOC program’s evolution towards greater professionalization.

**Table 2** presents a summary of the research findings along with the incidence of the related systemic tensions through both a disaggregated analysis of the various phases of the MOOC design cycle and the aggregated analysis of the HDFx MOOC program. As a result, it can be seen that, in its disaggregated form, the activity systems analysis of the five phases in the MOOC design cycle resulted in Tensions (a-f), which substantiated the secondary findings of this study, respectively, Findings 2, 3, and 4. By contrast, the aggregated activity systems analysis of the HDFx MOOC program resulted in Tensions X, Y, and Z, which corroborated this study’s principal finding, Finding 1, related to the emergence of work-based learning through multidisciplinary collaborations among participants in labor-integrated activities.

| FINDINGS  | PHASE OF MOOC DESIGN CYCLE                                     | SYSTEMIC TENSIONS                   | DESCRIPTION  |
|---|--|-------------------------------------|--|
| <b>Finding 1: Work-based Learning via Labor-integrated Activities</b> | Instructional Design, Production, Implementation               | (X) Subject vs. Tool                | Challenges of professional practice deriving in learning pressures for members of the multidisciplinary HDFx team upon using the edX MOOC platform for delivering MOOCs to LAC   |
|   | Instructional Design, Production, Implementation               | (Y) Tool vs. Object/ Outcome        | Technical or pedagogical challenges with edX platform/MOOC modality hindering the HDFx program’s objective of delivering top-quality educational opportunities for LAC   |
|   | Needs Assessment, Instructional Design, Production, Evaluation | (Z) Community vs. Division of Labor | Political and institutional environment at HDF that support or hinder participants’ work performance and multidisciplinary collaborations – contextual factors impacting the HDFx MOOC program’s evolution towards greater professionalization |

**Table 2** Study Findings With Aggregated and Disaggregated Systemic Tensions.

| FINDINGS  | PHASE OF MOOC DESIGN CYCLE | SYSTEMIC TENSIONS                               | DESCRIPTION  |
|---|----------------------------|---|--|
| <b>Finding 2: Developing Educational Resources or Learning Activities</b> | Instructional Design       | (X), (Y), (Z) ↔ (b) Subject vs. Object/ Outcome | Complicated negotiation between SMEs and instructional designers over educational resources and learning activities for instructional design proposal                        |
|   | Production                 | (Y), (Z) ↔ (c) Rules vs. Division of Labor      | Complex multidisciplinary collaborations and expensive staffing solutions required for producing media-based educational materials for MOOCs                                 |
|   | Implementation             | (X), (Y) ↔ (e) Tool vs. Community               | Learning pressures for participants in connection to the practical development and management of educational materials – e.g. discussion forums                              |
|   | Needs Assessment           | (Z) ↔ (a) Division of Labor vs. Object/Outcome  | Uneven compliance among participants with the assigned responsibilities and anticipated time commitments listed on project chart   |
| <b>Finding 3: Need for Improving Organizational Processes</b>             | Needs Assessment           | (Z) ↔ (a) Division of Labor vs. Object/Outcome  | Uneven compliance among participants with the assigned responsibilities and anticipated time commitment listed on project chart  |
|   | Production                 | (Y), (Z) ↔ (c) Rules vs. Division of Labor      | Complex multidisciplinary collaborations and expensive staffing solutions required for producing media-based educational materials for MOOCs                                 |
|   | Production                 | (X), (Z) ↔ (d) Tool vs. Community               | Inconsistent adoption of collaboration tools by different team members with implications for multidisciplinary work streams  |
|   | Evaluation                 | (Z) ↔ (f) Tool vs. Division of Labor            | Key gap of data analyst position for evaluating course offerings and conducting research via big data analytics for HDFx team  |
| <b>Finding 4: Facing Constant Technological Upgrades</b>                  | Production                 | (X), (Y) ↔ (d) Tool vs. Community               | Learning pressures in connection to constant upgrades by edX platform  |
|   | Implementation             | (X), (Y) ↔ (e) Tool vs. Community               | Preoccupation among participants with the provision of technical or content support for course registrants in response to changes with the functionality of the edX platform |

## DISCUSSION OF FINDINGS

This section presents the synthesis of the four main findings of this study with the conceptual underpinnings of work-based learning theory and cultural historical activity theory (CHAT). At the same time, the systemic tensions identified through the preceding application of the activity systems analysis framework are discussed as catalysts for the learning experiences reported by participants.

### FINDING 1 DISCUSSION: UNANIMOUS WORK-BASED LEARNING VIA LABOR-INTEGRATED ACTIVITIES

Finding 1 determined that the totality of participants' (100%) reported experiences of work-based learning through their engagement with labor-integrated activities related to the Needs Assessment, Course Design, Production, Implementation, or Evaluation phases of edX MOOCs. This finding corresponded to the principal research question of this study, which aimed to understand whether and how participants experienced learning through their work with the multidisciplinary design of edX MOOCs for LAC. A more specific analysis of participants' responses—corresponding to the subsequent findings of this investigation in response to its secondary research questions—identified that they had encountered significant learning experiences or anticipated having to face future learning experiences as a result of: preparing and administering educational resources or learning activities for MOOCs (Finding 2), the need for improving organizational processes at the HDFx program (Finding 3), and the constant development of technological tools (Finding 4).

Finding 1 aligned closely with the literature on work-based learning, as it determined that the learning reported by all the study participants conformed to the concept of “labor-integrated learning” which, as stated in Freire (2020), described learning at work as resulting from the direct participation in processes of value production (Malloch et al., 2011; Sonntag & Stegmaier, 2007; Stenström & Tynjälä, 2010, as cited in Weber, 2013). Thus, in contrast to the concept of “labor-related learning” describing learning at work separately from processes of value creation, participants reported labor-integrated learning experiences as an outgrowth of their direct participation in multiple collaborative processes geared towards the generation of value for the enterprise—namely, the performance of multidisciplinary object-oriented activities aimed at the successful completion of each of the five phases in the HDFx MOOC design cycle.

In this sense, Finding 1 corroborated Watkins’s description of labor-integrated learning “as a by-product of some other activity,” based on Marsick and Watkins’ (1990, as cited in Marsick, 2006) argument that “[l]earning at these different levels is all the more apparent in informal and incidental modes because learning is not subject to design and control by trainers... [but] rests primarily in the hands of the learner” (pp. 53–54). Furthermore, in keeping with Dewey’s (1933) practical view of learning from experience, which expounded experiential learning in response to the reflective and systematic processing of “disjuncture[s] between what is expected and what occurs” in problem solving or trial-and-error experimentation (Marsick, 2009, p. 266), the systemic tensions identified through the application of the activity systems analysis framework (Engeström, 1987) became a prospective catalyst for individual, communal, and organizational learning inherently linked to the sociohistorical conditions of the HDF as a contextually bounded activity system. Such an expansive view of work-based learning aligned with Lewin’s (1947) interpretation of human behavior as emerging from the interaction between person and environment.

As outlined in **Table 2**, three system-wide tensions (X, Y, Z) substantiated Finding 1 by sparking reports of work-based learning via labor-integrated activities among participants. Tension X documented challenges of professional practice and related learning pressures among members of the multidisciplinary HDFx team following the adoption of the edX platform for delivering MOOCs to LAC. Such factors were identified to have played a determinant role during the collaborative work processes pertaining to the Instructional Design, Production, and Implementation phases. The same three phases were concurrently influenced by the effects of Tension Y, representing technical or pedagogical challenges with the functionality of the edX platform that were reported as hindering the HDFx MOOC program’s objective of delivering top-quality educational opportunities for LAC. Finally, Tension Z represented the political and institutional conditions at play at the HDF that supported or hindered participants’ work performance and multidisciplinary collaborations. The factors illuminated by Tension Z were detected during the Needs Assessment, Instructional Design, Production, and Evaluation phases, thus leaving only the Implementation phase outside of its influence.

Furthermore, as Finding 1 framed the subsequent findings corresponding to the secondary questions guiding this investigation, Tensions X, Y, and Z were also manifest in the labor-integrated processes that informed such findings via corresponding phase-specific tensions (Tensions a-f). Through this prism, the Instructional Design phase was the most contested of all five phases in the MOOC design cycle, given the overlapping incidence of all three system-wide tensions during labor-integrated processes of instructional design. Such confluence, then, set the context for how participants developed practical knowledge developing educational resources or learning activities (Finding 2).

Meanwhile, the predominance of Tension Z regarding the conditions contributing to the need for improving the HDFx MOOC program’s organizational processes (Finding 3) revealed the transcendental effects of the reigning political and institutional climate at the HDF over the organizational structure of its nascent MOOC program. Lastly, as illuminated by the combined effects of Tensions X and Y, the participants’ concern over forecasting a future need for learning in response to the constant development of technological tools (Finding 4), anticipated issues of professional practice as well as technical or pedagogical challenges concentrated mainly during the production and implementation phases.

In sum, by analyzing participants’ widespread reports of on-the-job learning via labor-integrated experiences through the dual CHAT consideration of individual and collective object-oriented

activities, all within a given contextually-bounded activity system, this research study upheld a core assumption of work-based learning in which “[v]ocational achievement is not only related to fulfilling the goals of the particular workplace, but also to support personal (e.g. emotional stability) and organizational goals (e.g. creating a positive working climate, proposing meliorations, generating additional resources)” (Sonntag & Stegmaier, 2007, as cited in Weber, 2013, p. 2). Furthermore, as Finding 1 set the groundwork for the subsequent findings in a way that recognized gaps of practical knowledge or skills among participants, the need for updating outdated organizational processes, and future learning pressures in connection to constant technological changes, it ultimately also corroborated that “[t]he corresponding learning and developmental processes take place in workplace settings—especially for purposes of gainful employment for unskilled workers as well as those aspiring to advance their careers” (Weber, 2013, p. 4).

## **FINDING 2 DISCUSSION: DEVELOPING EDUCATIONAL RESOURCES OR LEARNING ACTIVITIES**

Finding 2 of this study, reported by 80% of responses, determined that participants had gained practical knowledge developing educational resources or learning activities through their engagement with labor-integrated activities at the HDFx MOOC program. This finding corresponded to sub-question 1a, which sought to understand the types of knowledge, skills, or behaviors participants believed were necessary to succeed in working with edX MOOCs.

As anticipated by the preceding discussion on Finding 1, the generation of multidisciplinary professionals that launched the HDF’s MOOC program for LAC denoted a typical pattern of experiential learning, in which participants learned by doing. That is, they learned through the “direct encounter with the phenomena being studied rather than merely thinking about the encounter, or only considering the possibility of doing something about it” (Borzak, 1981, p. 9). Within a context in which “nobody had worked with MOOCs, nobody knew what the process was like; what we had to do, what we didn’t have to do” (Valeria, administrative assistant, Personal communication, July 28, 2016), the only certainty was the abundance of learning challenges and opportunities.

**Table 2**, for example, listed the most prominent systemic tensions encountered by participants—a group of generally well-educated but formerly novice MOOC professionals—through their engagement with labor-integrated processes of value creation during the various multidisciplinary phases of the MOOC design cycle. In this sense, it was determined that participants developed practical know-how in creating educational resources and learning activities for MOOCs amid the heat of complicated negotiations between subject matter experts and instructional designers over the selection of such content. On one hand, subject matter experts tended to advance an expansive approach to content management during the Instructional Design phase that considered their vast and advanced knowledge on a given topic for possible inclusion in a MOOC. On the other hand, instructional designers promulgated a reductionist view that prioritized essential and specific content aimed at fostering the development of practical skills among course registrants.

The mediation outcome between these two perspectives would then inform the development of an instructional design proposal, providing a blueprint for the subsequent production and implementation of the respective course’s educational resources (e.g., texts, videos, graphics, games, simulations, etc.), and associated learning activities (e.g., watching instructional videos, responding to case study exercises, participating in discussion forums, etc.). However, while at a first glance the origins of this tension could be reduced to an argument between information-based and practice-based methodologies of instruction, further analytical elements emerged when larger systemic conditions were factored in. For instance, as much as instructional designers advocated for the production of more specific resources and practical activities, the lack of a consistent knowledge base among the large number of MOOC registrants, coupled with the edX platform’s generic, media-based interface imposed systemic limits on their eventual implementation.

As a consequence, through the period covered by this investigation, the HDFx MOOC program has produced a general outcome characterized by courses of a predominantly basic or introductory level. Felipe, a subject matter expert, referred to a MOOC he participated in as “a course, I would say, 101...but basic to understand the language, understand the principles, the basic concepts” (Personal communication, July 28, 2016). In that sense, when comparing that

outcome against the three categories of MOOCs identified in the literature—network-based or cMOOCs, task-based, and content-based or xMOOCs (Yeager et al., 2013)—the researcher concluded that HDFx MOOCs mainly represented an example of content-based or xMOOCs. A distinguishing factor of this kind of courses is that “[c]ontent acquisition is more important in these classes than either networking or task completion, and they tend to use instructivist pedagogy. Traditional assessment, both formative and summative, may be emphasized. Mass participation seems to imply mass processing” (Three Kinds of MOOCs, n.d.)

It is important to note, however, that these categories are unrestricted and, as such, MOOCs may include elements or characteristics from all three categories while getting defined by the dominant tendency they display. In this sense, while HDFx MOOCs may generally be defined as content-based or xMOOCs, many of its courses still employed elements from task-based MOOCs—such as case study exercises that required registrants to demonstrate analytical skills towards the completion of hypothetical problems or situations. Similarly, the HDFx team has begun to experiment with different methods for improving the administration of discussion forums, borrowing in a way from the high value and emphasis that network-based or cMOOCs place on facilitating timely and meaningful interactions among registrants towards the generation of distributed new insights and understandings.

Finally, the complex multidisciplinary collaborations and expensive staffing solutions necessary for satisfying the media-based instructional functionality of the edX MOOC platform represented yet one more systemic pressure for participants as they learned how to prepare and administer educational resources and learning activities. Chief among these challenges were the intense labor-integrated processes required for producing instructional videos, especially when considering that most participants had not had any prior exposure to working with this methodology. As such, the coordination, production, and deployment of instructional videos highlighted the learning-by-doing approach to the preparation of educational resources and learning activities that prevailed during the beginning stages of the HDFx MOOC program.

For example, subject matter experts needed to adjust their normal teaching style away from the presentational or online formats they were used to in order to adapt it to the video-based modality of MOOCs. Similarly, instructional designers needed to map the course’s educational content with the production of videos to ensure proper sequential and messaging alignment. Video producers, in turn, discovered that shooting instructional videos demanded the use of a unique stylistic approach, characterized by the emphasis on scripting and messaging rather than on the elaborate production values or effects of other kinds of videos. Administrative assistants, and production coordinators in particular, became the essential nexus in charge of researching and contracting video companies from throughout LAC, scheduling shoots on the limited availability of subject matter experts, marking scripts and providing feedback during post-production, and approving final edits. Lastly, platform technicians handled the uploading and hosting of videos according to each course’s corresponding configuration on the edX platform. In sum, participants discovered how to prepare and manage instructional videos and the rest of educational content necessary for hosting MOOCs on the edX platform by delving directly into different processes of multidisciplinary collaboration.

### **FINDING 3 DISCUSSION: NEED FOR IMPROVING ORGANIZATIONAL PROCESSES**

Finding 3 of this study reported that 17 out of 20 participants (85%) defined the need to improve the organizational processes for collaborating among members of the HDFx MOOC program as the most important contextual condition impacting their work. This finding emerged in response to sub-question 1b, in which participants identified the main institutional, technological, or pedagogical factors that supported or inhibited their work performance. While highlighting the complexities of structuring multidisciplinary collaboration, an essential requirement for delivering MOOCs to LAC, the reported emphasis on organizational processes corroborated the relevance of social explanations of learning identified in the adult education literature.

As an alternative to overly cognitive approaches, social learning theories favor a systems- or network-based understanding of practice and interaction, derived from patterns “of increased participation in activity” (Bruner, 1973; Cole, 1988; Lave, 1988; Mehan, 1983; Norman, 1980; Rogoff, 1994; Wertsch, 1997, as cited in Riel & Polin, 2004, p. 17). “Intellectual development becomes a process of negotiation of meaning in everyday practice with others” (Dewey, 1916; Vygotsky, 1978, as cited in Riel & Polin, 2004, p. 17). Thus, in the context of this study, work-

based learning and CHAT theories enabled the researcher to document, analyze, and identify manifestations of labor-integrated experiential learning amid participants' personal accounts of multidisciplinary collaboration within the HDFx MOOC program.

The adult education literature further recognized that even though people might experience instances of informal or incidental learning, derivative forms of work-based learning, “[they] are not always conscious of it” (Marsick & Watkins, 1990, p. 12, as cited in Marsick, 2006, p. 54). Such lack of awareness complicates the documentation of learning episodes and, thus, the management of organizational support systems for professional development. Li et al. (2009, as cited in Marsick, 2009) argued that the construction and administration of knowledge depend on the capacity “to turn tacit knowledge into explicit, codified knowledge that can be shared through different kinds of systems. The emphasis is on share-ability so that others can benefit from what individuals have learned” (p. 270).

As a longstanding financial and research institution, the HDF places high value on documenting its practices in search of learning from them and constantly improving its processes. From this institutional context, then, it followed that the evaluation phase in the MOOC design cycle included joint activities between the HDFx team and client departments in which participants discussed general problem areas and made improvement recommendations at the end of every MOOC offering. Similarly, platform technicians identified the ongoing mechanisms employed by their work group to document and share the practical knowledge emerging from labor-related activities—such as course-specific technical incident reports, guidelines for implementing new edX platform features or third-party applications, and online tutorials for new team members.

However, because of the very fact that the HDF is a longstanding institution that represents the diverse interests of countries from throughout Latin America and the Caribbean, it has also developed a unique set of cultural and political norms that can stifle or inhibit organizational change. Precisely, Tension Z (see [Figure 7](#) and [Table 2](#)), referring to the political and institutional environment of the HDF and its impact over participants' work-based performance and multidisciplinary collaborations, was identified through activity systems analysis as the most recurrent factor associated with the need to improve the organizational processes of the HDFx MOOC program. In this sense, the institutional environment at the HDF was found to have acted both as a support system that promoted the documentation and exchange of knowledge while also cultivating systemic tensions that inhibited the HDFx MOOC program's professional development.

Per the summary of systemic tensions for Finding 3 available in [Table 2](#), the manifestation of system-wide Tension Z through the various phases in the MOOC design cycle determined that, although organizational tensions played a role during processes related to Needs Assessment and Evaluation activities, such challenges were more pronounced during the Production phase. As a result, labor-integrated processes pertaining to the Production phase reflected these two specific complications: (a) complex multidisciplinary collaborations and expensive staffing solutions required for producing media-based educational materials, and (b) inconsistent adoption of collaboration tools by different team members with implications for multidisciplinary work streams. Ultimately, the HDFx team implemented a series of personnel changes to address such factors through its ongoing analysis of organizational processes.

As such, the role of production assistants was reorganized under the new title of production coordinators to reflect better the need for transversal support for production processes. Moreover, although the timeline for this study did not allow for the documentation of the impact of new roles in areas like big data analysis and audiovisual technology coordination, it became clear that such staffing changes responded to contextual pressures to improve the management of the complex multidisciplinary, multinational, and multi-tool collaboration workflows required for the production of MOOC educational materials. In sum, the need to improve the organizational processes of the HDFx MOOC program identified by 85% of participants should be understood in connection with the predominantly task-based structure that bounds their participation within similarly oriented labor-integrated processes and activities. Moreover, by grounding individual learning within a social or communal context, it is possible to understand better the reported labor-integrated learning experiences of participants in light of larger systemic tensions that both supported and inhibited their professional development in an indivisible relationship with the professionalization of the HDFx MOOC program.

As reported through the fourth and final finding of this investigation, a majority of participants (75%) identified the constant development of technological tools as the most anticipated driver for their future learning while working at the HDFx MOOC program. This finding corresponded to sub-question 1c, which sought to understand the challenges and opportunities for learning at work anticipated by participants in connection with future changes in MOOC technologies. Finding 4 carried echoes from the preceding findings in the study, evidenced by participants' preoccupation with the impact of future technological changes over the generation and administration of educational content as well as over the stated institutional goal of using MOOCs to deliver top-quality education opportunities for LAC.

Therefore, by connecting individual learning expectations with institutional objectives, the study participants upheld a core assumption of work-based learning in which “[v]ocational achievement is not only related to fulfilling the goals of the particular workplace, but also to support personal (e.g. emotional stability) and organizational goals (e.g. creating a positive working climate, proposing meliorations, generating additional resources)” (Sonntag & Stegmaier, 2007, as cited in Weber, 2013, p. 2). As such, the expectation of future on-the-job learning as a result of technological changes was reported by three of the four participants from each of the disciplines represented in this study.

However, despite a seemingly homogeneous rate of acceptance, participant responses reflected two fairly distinct patterns across disciplines. For instance, given the central role of software and hardware tools in the work activities of platform technicians and media producers, both of these disciplines spoke about the impact of future technological developments over their projected learning needs from a predominantly technical perspective. On the other hand, subject matter experts, instructional designers, and administrative assistants based their responses on fundamentally pedagogical grounds.

Moreover, the summary for Finding 4 available in [Table 2](#) revealed that, among all five phases in the MOOC design cycle, those with the most anticipated incidences of systemic tensions were precisely the two phases in which technical and pedagogical elements intersected through labor-integrated activities—namely the Production and Implementation phases. For example, the Production phase was the only one to include the effective engagement of all five disciplines in processes of value creation. In fact, media producers were usually contracted just during this phase to assist with the creation of the various types of educational resources selected for a given MOOC or SPOC (e.g., videos, texts, graphics, animations, games, etc.). In this sense, administrative assistants acted as production coordinators steering the required multidisciplinary interactions of media producers or platform technicians, on the technical side, with subject matter experts and instructional designers, on the instructional side.

As a corollary of the intersection between the technical and pedagogical aspects that make HDFx MOOCs possible, participants zeroed in on perceived shortcomings with the current instructional functionality of the edX platform and connected their on-the-job learning projections with aspirations for undertaking future improvements. The leading complaint in this respect, voiced primarily by administrative assistants, instructional designers, and subject matter experts, had to do with the dysfunctional moderation of MOOC discussion forums. In their view, as a result of overcrowded registrant participation, the ensuing peer community discussions were rendered incoherent and ultimately lacked any substantial instructional value for course registrants. Thus, they were quick to identify future learning challenges in the quest to revamp a lackluster user experience that contradicted the stated institutional goal of the HDFx MOOC program.

Some efforts in that direction were already underway as the HDFx team experimented with ways to improve the administration of discussion forums. In this sense, future collaborations among the technical and instructional arms of the HDFx MOOC program will only be more indispensable, if the aim of facilitating timely and meaningful interactions among registrants capable of generating distributed new insights and understandings is to be accomplished—as proposed by the connectivist or cMOOC model of instruction (Three Kinds of MOOCs, n.d.; Yeager et al., 2013).

Ultimately, it must be noted that during the period covered by this investigation, participants reported certain innovative experiments regarding the moderation of learner communities happening around the HDFx program's SPOC offerings, or small private online courses, more so than with MOOCs per se. When added to the multiple areas in which MOOCs have been found

to struggle, such as low persistence and achievement rates among course registrants (Chafkin, 2013; Lewin, 2013; Perna et al., 2013), this fact only reiterated ongoing questions about the quality of learner support and ultimate sustainability of MOOC-based models of instruction, such as those found in the literature:

Whether MOOCs can be as successful without providing the same level of learner support [as SPOCs] is still an open question. After MOOC mania subsides, it may be that SPOCs will emerge as the preferred model for specialized learning, taking the online approach to smaller, targeted—and revenue generating—classes. (“SPOCs may provide what MOOCs can’t,” 2013)

## COMPETING INTERESTS

The authors have no competing interests to declare.

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