MOVING TO FLIPPED LEARNING: A DYNAMIC FRAMEWORK TO GUIDE INSTRUCTORS' MIGRATION PROCESSES IN HIGHER EDUCATION

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Abstract

Consistent with the increasing pressure to improve student-learning processes and the need of effective teaching, higher education institutions are evolving to create more engaging, meaningful learning experiences for their students. The recent adoption and rapid rise of the flipped classroom model in higher education are reflections of this transformation process. The literature on flipped learning has focused on describing frameworks to design a flipped class, but the transitional process to adapt the traditional mode of instruction to this teaching approach has not clearly conceptualized. This study suggests that flipped learning might be one part of a larger, systematic instruction cycle encompassing different instructional states and migration mechanisms across states, consistent with the assumption that a flipped classroom model must be progressively incorporated to reduce the impact of barriers to change the traditional mode of instruction in higher education. The aim of this study is to develop an instructional transformation model that could guide instructors in transiting from traditional classroom state to flipped classroom state in higher education institutions.

Keywords: flipped classroom, instructional states, migration mechanisms, relational variables, interaction.

1 INTRODUCTION

The increasing pressure for higher education institutions to be adapted in ways that meet the students' needs explains why student-centered learning environments are gaining popularity. In this regard, the flipped classroom or reverse teaching approach changes the lecture-centered mode of instruction to a student-centered learning approach that actively promotes an instructional design involving interactive pedagogy and technology ([1]). This approach has been linked with higher levels of students' engagement and motivation compared to traditional methods. Flipping the classroom reverses the traditional model of in-class lecture followed by homework, and shifts towards digitally-based homework as learning activities prior to the physical class, where students have to apply the knowledge learned by themselves through collaborative activities. Recent work on flipped classroom provides evidence of the increasing usage of this model in higher education (e.g., [2], [1]). Authors on this subject mainly discuss what characterizes the flipped classroom including technologies/activities used to engage students; time, cost and staff required to implement the flipped classroom; pedagogical acceptance by key stakeholders; and students outcomes. However, only a small number of studies analyses the design and conceptual frameworks of the flipped model, especially for higher education contexts.

Although flipped learning holds promise as an innovative approach that facilitates teaching and learning, several limitations and contingencies regarding its implementation are also recognized in the literature (e.g., [3]). For example, introducing the flipped classroom model can mean additional work and may require new skills for the instructor ([4]). Moreover, flipped classroom principles and elements must be carefully integrated for a better students understanding of the contents and engagement with the subject. These barriers frequently cause that teacher-centered and unidirectional instruction remain a common practice. According to the perspective adopted in this study, approaching the flipped model progressively and following a structured process can mitigate this challenging learning curve both for instructors and students. This learning process and, thus, the design and implementation of the flipped model, might be even harder in the higher education context, since the model has only recently migrated to higher education from Khan Academy (K12) ([5]). In this paper, the authors suggest that the flipped classroom might be one part of a larger, systematic instruction cycle encompassing different instructional states and migration mechanisms across states. This is consistent with the assumption that a flipped classroom model must be progressively incorporated to
reduce the impact of barriers to change the traditional mode of instruction in higher education. Drawing on Lewin's ([6]) longstanding characterization of change as broadly involving the stages of "unfreezing," "moving," and "refreezing," the aim of this study is to develop an instructional transformation model that could systematically guide instructors in transiting from traditional classroom state to flipped classroom state in higher education institutions. After identifying the key constructs (i.e., instructional state variables) that define the different instructional states, the authors argue that each state exhibits different construct levels and varied performance. The authors explicitly model migration paths as influenced by instructional tools reflecting migration strategies. They explore which migration strategies may be the most effective for moving across states. Finally, theoretical implications as well as insights and implications for educators are discussed.

2 LITERATURE REVIEW

Despite the fact that the flipped classroom model remains an under-researched area ([2]), it is a widespread theme in different research streams of education literature, including corporate training, universities and high school ([7]). Previous research in flipped classroom covers a wide range of applications and experiences in statistics ([8]), clinical/medical education ([9]), or management ([10]), among others.

Unlike the traditional teaching model, where the instructor explains new contents in-class and students take notes and work in problems at home, the flipped teaching is a popular new instructional model that reverses or "flips" the traditional role of the class time ([3], [2]). A flipped classroom model fundamentally changes the traditional lecture-centered mode of instruction to one that is more learning-centered that uses active learning to engage the student’s thinking during class time ([10]). In the flipped classroom, students use time at home to develop asynchronous learning activities ([1]), that is, they first study the topic by themselves ([11]) typically using materials created by the instructor or shared by another educator/s (e.g., Khan Academy, Coursera, edX, TED). These materials include recorded lectures, demonstration videos, adaptive quizzes, or anything in between ([2]). Class time is used for synchronous learning activities ([1]), that is, students try to apply the knowledge learned by themselves by solving problems and doing practical work (e.g., discussion, collaboration, problem-based activities) and the instructor’s interaction with students is more personalized and guidance-oriented instead of lecturing ([3]).

Flipped teaching has attracted a growing range of studies covering a wide number of aspects related to this mode of instruction, such as (a) the technologies and activities used to engage students; (b) time, cost and staff required to implement the flipped classroom; (c) pedagogical acceptance by key stakeholders; (d) students outcomes; and (e) design and conceptual frameworks of the flipped model ([1]). Regarding the research on conceptual frameworks to design flipped teaching experiences, prior works have mainly focused on the development of a set of design principles for a generic flipped classroom model (e.g., [10], [12], [13]). Authors such as Estes et al. ([5]) or Nguyen et al. ([2]) emphasize a framework for instructional design consisting of three stages or dimensions: pre-class stage or preparation dimension, in-class stage or interaction dimension and post-class stage or outcome dimension. In particular, the pre-class stage or preparation dimension describes the process of preparing for the upcoming classes and is developed in an asynchronous environment used by the instructor to inform, communicate and generate awareness among students. The in-class stage or interaction dimension describes the exchange relationship and dialogue between the instructor and students in the classroom and is developed in a synchronous environment. In this stage the instructor clarifies concepts and solves problems with the help of questions and prompts to increase student-teacher contact through in-class discussion, observation, and potentially the use of technologies such as learner response systems. Finally, the post-class stage or outcome dimension identifies students' learning outcome perceptions of reverse teaching practices and it is used for application and knowledge transfer. In this stage instructors have an opportunity to increase and sustain student motivation for engagement outside of class time, and to assess learner progress ([5], [2]).

This focus on exploring instructional designs to develop flipped classrooms has led to neglect the research on instructional models that could systematically guide instructors in transiting from a traditional classroom to flipped classroom. Existing literature does not describe a theoretical framework supporting instructors in the migration process from a traditional format in the design of a subject to a flipped format. This paper suggests that the flipped classroom might be one part of a larger inquiry or instruction cycle encompassing different instructional states and migration mechanisms across states.
3 CONCEPTUAL FRAMEWORK

Changing the traditional mode of instruction to a flipped learning approach demands instructors and students identify with the new mode of instruction. This requirement implies strategies that facilitate and strengthen the identification. Specifically, the conceptual model that is proposed in this paper stresses the need for following the general stages of a planned change and the associated migration strategies. For the purpose of this study the authors have adapted the Kurt Lewin’s characterization of a change process that incorporates three general states of change: unfreezing, changing or moving, and refreezing ([6]). Instructors and students tend to hold on to familiar perspectives, conceptions, and behaviors that define ways of doing things. Lewin ([6]) asserted that an effective change strategy begins by unfreezing current beliefs. When a change must be implemented, dissociation from previous attributes (‘unfreezing’ in Lewin’s theory) and re-association with new ones (‘refreezing’) are needed ([14]).

Consistent with this theory, in the higher education context, losing individual ties to lecture-centered mode of instruction and building ties to the new learning setting will depend on a transitional stage that leads to temporary connections to an experimental learning context. This means that a first step is recognizing the need for change and encouraging the replacement of traditional lectures with flipped learning. Unfreezing creates motivation to learn but does not necessarily control or predict the direction ([15]). Therefore, a second step would imply moving to an experimental or transitional state by taking specific actions and mechanisms to facilitate the change and involve students with the new approach. Finally, reinforcing and institutionalizing the change are major objectives at the refreezing stage, which will correspond to the full design and implementation of the flipped classroom. Refreezing bring stability and coherence to the fragmented experimentations that is the likely result of the transitional stage (see [16]).

A critical issue in Lewin’s theory ([6]) is that for change to occur there must be a motivating factor that encourages a change from the status quo. This factor initiates the unfreezing process, where traditional ideas and routines are called into question. In this regard, the increasing technological availability and innovative teaching channels make current educational approaches within higher education utilize blended learning at the expense of traditional lecture-based format ([1]). Accordingly, the intensification of students’ online interaction patterns derived from the adaptation to the online learning environment plays a critical role in unfreezing the shift towards flipped learning. Another key driver of change is also the increasing importance of the extent of student-teacher interaction (i.e., offline interaction) in the current higher education environment. Frequently, e-learning systems lacks of socialization; human beings increasingly need to socialize and learn from each other ([17]). According to Lewin’s view, successful change is a ‘group activity’ because changes to individual behaviour will be sustained only if group norms and routines are also transformed ([18]). An instructional transformation model to flipped learning will require increasing face-to-face (offline) interactions between instructors and students (i.e., group relationships) to ensure the progressive integration of the approach in class. Thus, in the final stage of the process, the teacher’s interaction with students is more personalized and guidance-oriented instead of lecturing ([2]).

Previous arguments provide the theoretical framework for the conceptual model, which is illustrated in Fig. 1. The authors theorize that each stage of change is referred to a different state in the proposed instructional transformation framework. The unfreezing stage corresponds to traditional classroom state, the moving state to the transitional state, and the refreezing stage to the flipped classroom state. The levels of online and offline interaction help determine the state variables that describe each state, as it is explained below. ‘Exploration’ and ‘exploitation’ represent two migration mechanisms that are set into action by instructional tools (i.e., migration strategies). Next sections will describe the model.
4 UNDERSTANDING THE INSTRUCTIONAL TRANSFORMATION MODEL: FROM TRADITIONAL TO FLIPPED CLASSROOM

4.1 Instructional state variables

There are several interpersonal variables that positively relate to learning. The student-teacher relationships share several similarities with other interpersonal relationships. In fact, teaching has been described as a relational process that follows the developmental stages from initial contact, through intimacy, to dissolution. The nature of such relationship is important to effective learning outcomes ([19]). Several studies demonstrate that students’ attitudes toward the content and the instructor, that is, affective learning, influence cognitive learning ([20]). Some studies have focused on analysing variables such as immediacy, communicator style, affinity-seeking, self-disclosure, solidarity, caring or humour (see [19]). However, there are relational variables that determine and characterize the development of each state in the proposed model. These variables capture different aspects of the student-instructor relationship and configure the core or articulator axes of the instructional design of each state. Few previous studies in education have addressed the analysis of these variables. We draw on literature on relational variables to justify their presence and relevance in the proposed transformation model. Accordingly, we focus on several theoretically grounded, nonredundant, and underlying relational state variables from the most studied relational constructs in the literature ([21], [22]) that have been adapted to the higher education context: closeness, dependence, communication, cooperation, acquiescence, norms and engagement.

Closeness. Student-instructor closeness encompasses the degree of warmth and open communication that exists between them. It implies give support to students in the school environment ([23]). Closeness facilitates students learning and is positively linked with their academic performance ([23], [24]).

Dependence. Although in the context of relationships dependence reflects evaluations of partner provided benefits for which there exist few alternatives ([25]), in our context student dependence refers to the need for teacher guidance or support. Birch and Ladd ([23]) state that dependency refers to student behaviors that are indicative of an overreliance on the teacher as a source of support.

Communication. Another important variable in the learning process is communication, which can be defined as the formal and informal sharing of meaningful and timely information between parts ([26]). Timely and relevant communication specially fosters trust by assisting in resolving disputes and aligning perceptions and expectations ([21]). In the high school context, timely and relevant communication between student and instructor may result in better performance.

Student cooperation is another relational variable, which implies that parties work together to achieve mutual goals ([26]). The counterpart of cooperation is student acquiescence, defined as the degree to which a student accepts or adheres to instructor’s specific requests or policies (see [21]). Cooperation of the student is proactive. Acquiescence is reactive and passive. In both cases, the
extent to which a student cooperates, agrees or complies with the demands of the instructor will make the relationship work.

**Group norms and routines.** Related to the previous concepts is the variable ‘group norms and routines’, which emphasizes the instructor concern about the success of the learning process. Norms guide and regulate the standards of conduct (see [27]), establish learning methods and tools, facilitate decisions and are also useful for evaluating the state of the student learning process.

**Engagement.** Although previous literature demonstrates that the term ‘engagement’ appears to have many meanings, one widely extended definition of an engaged student is “a student that actively participates in the class, attending, working, interacting or cooperating with others” ([28], [29]). Student engagement is one of the primary components of effective teaching ([1]). Students display many behaviours inside and outside the classroom that reflect their interest in learning ([30]), which is translated in highest levels of academic achievement ([29]). Nevertheless, student engagement lies on a continuum from disengaged to engaged and it is higher when they are supported by engaged instructors ([28]).

### 4.2 Instructional state conceptualizations

According to the proposed model, we differentiate among three instructional states characterized using the relational variables defined in the previous section. Relational variables have different impact or presence on each instructional state depending on the level of student-instructor interaction.

**Traditional classroom state** is almost reduced to a kind of discrete transaction where the instructor teaches contents and the student, after the pertinent study, makes an exam. In this state, the teacher's interaction with students is limited to the explanation of new contents (lecturing), solving doubts, taking the exam and, if appropriate, its revision. There is an absence of interaction among students and with the instructor. This state is characterized by very limited communications and narrow content. Instructors commonly fail to see the necessity of managing their relationships with students. These relationships are distant and cooperation is missing given the lecture-based format. This fact generates a high dependence of students as it is not usual that the teacher provides extra material apart from the programme of the subject and some lecture notes. Students also need to know the norms established for that subject –norms are very basic in this first instructional stage- that they should follow. As students passively meet those rules and agree to attend classes, they show high acquiescence. Finally, the engagement of the student is very low, because participation, interaction and cooperation are not encouraged in this state. The traditional classroom state has been very common in the past in higher education, but the inefficiency of this instructional stage gives rise to an unfreezing process.

**Transitional state.** The unfreezing process initiated because of the inefficiency of the previous state, together with the technological development, moves to an experimental or transitional state that gives rise to new ways of teaching and communication channels. In this instructional state, instructors and students initiate a process of meeting one another, exchanging information, and adjusting expectations similar to what any two individuals would go through in developing a relationship ([19]). Previous authors suggest introducing this transitional state through the implementation of only one aspect of the flipping classroom (i.e., pre, in or post class) ([5]), or even through the concept “Friday flip,” partially flipping the contents ([31]). These changes require an extra effort of the instructor, who should begin with the moving process and needs to learn new learning-teaching methods. It also needs certain changes in students and their level of engagement with the subject. For example, they have to cope with more varied activities and instructional formats translated into a moderate in-class and out-of-class interaction between student and teacher, as well as a greater interaction among students in class and in online platforms provided by the instructor. Therefore, this instructional state comes with a closer relationship between parties. Since there is more content and instructions available, the learning process is more autonomous, and dependence and acquiescence are more reduced compared to the prior state. Cooperation has more presence in this state for the need to develop group activities. As the instructor uses simultaneously more learning instruments, it is necessary to clearly define the norms and routines of this new teaching format.

**Flipped classroom state** is student-centered and uses active learning to engage students. The relationship between instructor and student is very close at this state. Flipped classroom encompasses three stages (i.e., pre, in and post class) and varied duties for instructor and students. Therefore, for effective relationship the parties may direct much effort toward carefully define (on the part of the instructor) and know (on the part of the student) the learning process and instruments. In
flipped classroom, engagement becomes a key factor for its success and should be present in each of the three stages of this instructional level. Student autonomy is more present in this state with the goal of improving student learning ([28]). There is a more personalized and guidance-oriented interaction between instructor and students represented by higher levels of online and offline communication. There are also higher interaction and online cooperation among students, encouraged by the presence of new technological communication tools. The level of dependence in this state is low because the group norms and routines are clearly established since the beginning of the instruction.

Table 1 summarizes the levels of presence of the relational variables analyzed as well as the axes through which the conceptual model is proposed.

<table>
<thead>
<tr>
<th>Axes/Variables</th>
<th>Traditional classroom</th>
<th>Transitional classroom</th>
<th>Flipped classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online interaction</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Offline interaction</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Closeness</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Dependence</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Communication</td>
<td>Low</td>
<td>Moderate/high</td>
<td>High</td>
</tr>
<tr>
<td>Cooperation-Acquiescence</td>
<td>Low-High</td>
<td>Moderate-Moderate</td>
<td>High-Low</td>
</tr>
<tr>
<td>Group norms and routines</td>
<td>Basic</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Engagement</td>
<td>Low</td>
<td>Moderate-high</td>
<td>High</td>
</tr>
</tbody>
</table>

5 MIGRATION MECHANISMS AND DRIVERS OF INSTRUCTIONAL STATE MIGRATIONS

According to the proposed model, we analyze the two migration mechanisms for moving across the three instructional states previously described. These two migration mechanisms, i.e., exploration and exploitation, which seek to promote state migrations, are influenced by migration strategies that encompass a combination of instructional tools. Instructional tools have different impact or presence on each migration mechanism depending on the pattern of online/offline interaction that governs each migration mechanism.

Although previous studies about flipped learning have focused on analyzing instructional tools related to the implementation of flipped learning models ([3], [4]), these tools are not organized along a continuous migration process. In other words, previous research about instructional tools does not indicate when these tools may be most effective for moving across different instructional states needed to achieve the flipped classroom state. Therefore, this research addresses the importance to consider the two migration mechanisms called exploration and exploitation, which are adapted from other learning environments ([32], [33]).

Exploration migration mechanism is the first migration mechanism, placed between the traditional and transitional classroom states. In learning environments different from higher education, exploration has been defined as a mechanism devoted to collect information through search and discovery ([32]) and implies searching for new knowledge without expecting certain results, at least in the short term ([33]). Applying this rationale to the proposed conceptual model, the main objective of the instructor during this first migration mechanism to flipped learning is to gather information from students (feedback) that have followed a subject in its traditional classroom state. This information offers evidence regarding the most (and the least) appropriate sections, topics or activities in the subject that present less (and more) difficulties for students, and that are more (and less) likely to be flipped. Instructional tools that can be used during the exploration migration mechanism are surveys, focus groups and personal interviews between the instructor and students.

Exploitation migration mechanism is the second migration mechanism, placed between the transitional and the flipped classroom states. In learning environments different from higher education, exploitation implies refinement, selection and implementation of existing knowledge (acquired through exploration), and has more certain and proximate results than exploration ([32], [33]). If we apply this
logic to the proposed conceptual model, the main objective of the instructor during this second migration mechanism to flipped learning is to prepare the key elements needed to achieve the flipped classroom state. With respect to the main elements needed for flipped learning, “four pillars” must be applied in practice ([34]): (a) flexible environments providing a variety of learning models; (b) learning culture allowing a shift from an instructor-centered culture to a student-centered culture; (c) intentional content which has to be carefully selected and evaluated by instructors; (d) professional educators even more essential in this model than in the traditional one. Despite the fact that these four components of the flipped learning seem comprehensive enough, they are not enough for higher education ([3]) mainly because they do not specify which kind of activities should be completed during the class, how these activities should be delivered, they do not perfectly combine student and instructor points of view, and they do not account for computer learning platforms. To solve these problems, Chen et al. ([3]) include three additional components: (e) Progressive Network Activities “learning by doing” and “learning by networking”; (f) Engaging and Effective Learning Activities with a proper combination of structure/dialogue of the class and students’ autonomy; and (g) Diversified and Seamless Learning Platforms (the class that is conducted anywhere at any time). Therefore, the instructional tools that can be used during the exploitation migration mechanism are summarized in Table 2 around the main elements of the flipped.

### Table 2. Instructional tools proposed for the exploitation migration mechanism.

<table>
<thead>
<tr>
<th>Element of the FLIPPED</th>
<th>Instructional tool/s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flexible Environments</strong></td>
<td>In-class face-to-face interactions and asynchronous interactions ([5], [35]).</td>
</tr>
<tr>
<td><strong>Learner-Centered Approach</strong></td>
<td>Time before class: instructor reminds students of next face-to-face session, sends students module guide, instructions and materials available, and reminds students to bring their notes to class (tool: e-mail or similar) ([2]).</td>
</tr>
<tr>
<td></td>
<td>Time in class: instructor and students explore topics in greater depth with the following possible order: a) brief questions of the online lectures (tool: Kahoot! -online quizzes-); b) deeper discussion topics and key points from lectures (tool: group discussions, sharing); c) students have to complete assignments individually (tools: Google Form, Flubaroo) ([3], [5], [2]).</td>
</tr>
<tr>
<td><strong>Intentional content</strong></td>
<td>Preparation of a clear plan of the subject, specifying contents, timing and flip stage (pre, during, post class) ([35]).</td>
</tr>
<tr>
<td><strong>Professional Educators</strong></td>
<td>Instructor should develop a careful preparation of classes, learn new skills and apply effort in planning, implementing and revisiting ([4]). Tools: automatic correction tests, tools to detect plagiarism (e.g., Turnitin), forums to discuss some topics among students, etc.</td>
</tr>
<tr>
<td><strong>Progressive Network Learning Activities</strong></td>
<td>Resources to learn before class: Coursera, edX or YouTube. Time in class should be used to apply this knowledge to solve specific problems ([5], [2]).</td>
</tr>
<tr>
<td><strong>Engaging and Effective Learning Experiences</strong></td>
<td>Preparation of a clear plan of the subject, specifying where these contents are going to be developed (in the physical or in the digital class) ([35]).</td>
</tr>
<tr>
<td><strong>Diversified and Seamless Learning Platforms</strong></td>
<td>Usage of learning digital platforms (e.g., BlackBoard Learn, Moodle) and different tools inside digital courses (e.g., teaching materials such as readings, videos, podcasts; forums; wikis; chats; Q&amp;A) ([3], [1]).</td>
</tr>
</tbody>
</table>

### 6 CONCLUSIONS

According to the literature review, previous research on flipped learning fails to define an instructional model that could guide instructors in the migration process from a traditional classroom to a flipped learning approach. Consequently, and drawing on Lewin’s ([6]) longstanding characterization of the change process, this paper provides a conceptual framework that identifies three general stages of change (i.e., traditional classroom state, transitional state and flipped classroom state), as part of a developmental, transformational process. The instructional transformation model also shows the students’ online and offline interaction patterns in each state, and the existence of two migration

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mechanisms among states (i.e., exploration and exploitation). The proposed states have been conceptualized using relational variables. In particular, we have focused on several theoretically grounded, nonredundant, and underlying relational state variables from the most studied relational constructs in relationship marketing literature: closeness, dependence, communication, cooperation, acquiescence, group norms and routines, and engagement ([21], [22]). These variables reflect unique patterns that characterize each state. In addition, we have examined migration strategies across states based on different instructional tools. In sum, this research thus moves beyond extant flipped learning literature by complementing prior research with a comprehensive conceptual model that can guide instructors in transiting from traditional classroom state to flipped classroom state in higher education institutions.

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