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# Reflective, Reflexive Guided Appropriation: Facilitating Teacher Adoption of Game Based Learning in Classrooms

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**Abstract:** The use of games to advance learning in the classroom often appeals to teachers perplexed by students who disengage from conventional instructional processes. However, the research literature suggests that enthusiasm quickly wanes when obstacles are encountered and things do not work out as expected. Consequently, the take-up of game-based learning is inhibited, and the “scaling” of techno-pedagogical innovations into routine classroom practice stalls. Recognizing that teacher preparation is crucial for successful implementation of innovative game-based curriculum in the classroom, a process-centric “appropriation model of innovation uptake” was initially suggested as a conceptual tool with which to approach the said challenge. This model draws on ideas from Coburn (2003) on “rethinking scale” in the context of school reform, as well as those of Clark and Dede (2009). The suggested model shifts the focus of attention from a system perspective of “scaling” to a model where the teacher plays the central role. It foregrounds the construct of “shift” as being central to what is required for teachers to sustain and to spread the adoption of game-based learning pedagogy. The model positions depth and ownership as critical factors that influence the likelihood of achieving a stable shift in teaching practice, while recognizing the importance of system support for accommodating and rewarding innovative teaching practice. This appropriation model helped us to engage in a research project whose objective has been to level up teacher capacity for successfully enacting game-based learning in the classroom. This paper describes (a) the appropriation model and its evolution over the course of our research, and (b) challenges faced by teachers in enacting the game-based learning pedagogy. The paper reports findings from three separate implementations of the Statecraft X game-based learning curriculum. We worked with four schoolteachers in two government secondary schools in Singapore. Over the course of our work, the initial appropriation model evolved to include a ‘teacher-identity’ component that is strongly influenced by teacher professional development. Thus, our model developed into a process model of teacher development through reflective, reflexive guided appropriation. In the paper, we cite instances of tensions faced by teachers that are related to (1) sense of professional responsibility, (2) entrenched teaching habits, (3) questioning of deeply seated epistemological beliefs and values, (4) misalignments with conventional modes of assessing student learning. These tensions illuminate the somewhat unpredictable pathway of learning and development that teachers need to traverse and make sense of. Our findings suggest that, to the extent the development process was seriously dislocating and triggered a process of introspective reflection, it was also the most deeply transformational. Teachers who did not experience perturbation to their understanding and a deep sense of disequilibrium showed the least growth in terms of professional development. In general, teachers have to deal with complex personal issues, in addition to managing social and institutional factors, as they navigate the process of changing their teaching practice.

**Keywords:** appropriation, professional development, reflective, reflexive, scaling

## 1. Introduction

The use of games to advance learning in the classroom often appeals to teachers perplexed by students who disengage from conventional instructional processes (Sandford and Williamson, 2005). However, the research literature suggests that enthusiasm quickly wanes when obstacles are encountered and things do not work out quite as expected. Kirriemuir and McFarlane (2004) suggest that key issues teachers must grapple with include committing to the training they need to teach effectively with digital games, understanding the games being used, and keeping students “on track” with respect to curricular goals. In addition, outside of the classroom, teachers also often face cultural non-acceptance of games as potentially powerful learning tools. Key stakeholders such as educational administrators and parents often resist the use of games. Consequently, the take-up of game-based learning is inhibited, and the “scaling” of techno-pedagogical innovations into routine classroom practice stalls. In this paper, we report on our research to address the said problem. It should be stated early that our efforts at scaling should be understood in the context of how pedagogical

innovation, incorporating new media such as games, can be fostered in the context of educational reform (Fullan, 2007). We are especially sensitive to the human side of school change (Evans, 2001). We avoid using the term “scaling up,” widely used by other authors (Dede et al., 2005, Schneider and McDonald, 2007), because it carries an over-simplistic multiplicative connotation that we do not support.

Our work takes place in the context of a funded research project to level up teacher capacity to enact game-based learning in a manner consistent with the performance–play–dialog (PPD) design model (Chee, 2011). Prior work with the Statecraft X curriculum, a game-based learning program for citizenship education, has demonstrated efficacy with respect to student learning (Chee et al., 2011). However, not all teachers successfully appropriated the target pedagogy. A key barrier to success was epistemological.

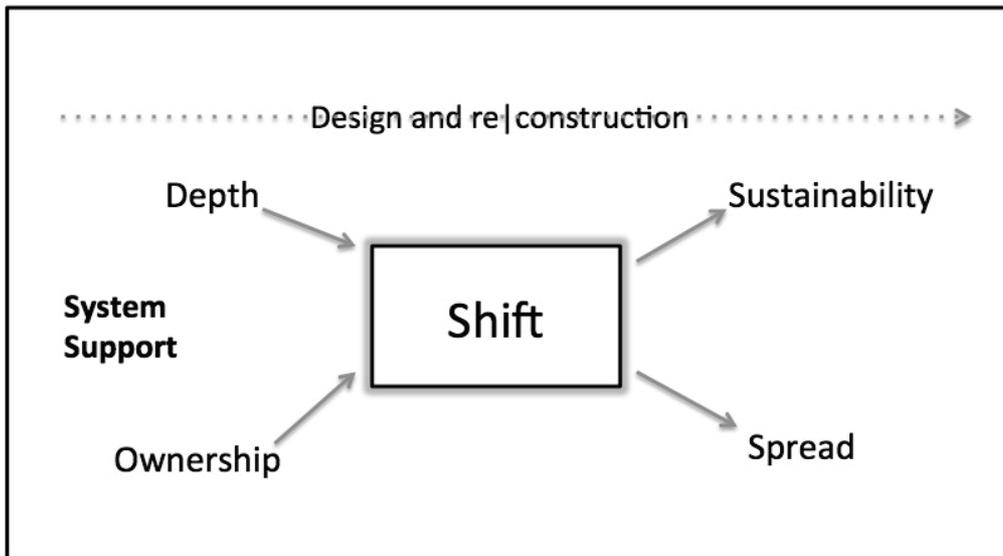
In this paper, we share our experience to date and report how we have addressed the challenge of scaling educational innovation with game-based learning through leveling up teacher capacity. In the next section, we describe our initial theoretical conceptualization of teachers leveling up their capacity through an appropriation model of innovation uptake. Section 3 presents a revised model—the reflective, reflexive guided appropriation model (RRGA)—that depicts the evolution of our thinking of what is required to support innovation uptake. Our updated thinking arose from working with four teachers in two schools, as we scaffolded their enactment of game-based learning through professional development. Section 4 highlights some key challenges and travails that teachers faced, based on empirical research data drawn from teacher interviews. These difficulties provide the justification for changes made to the original appropriation model. Section 5 summarizes and discusses our findings, and Section 6 concludes the paper.

## **2. The appropriation model of innovation uptake**

Recognizing that teacher preparation is crucial for successful implementation of innovative game-based curricula in the classroom, a process-centric “appropriation model of innovation uptake” was initially suggested as a conceptual tool with which to approach the said challenge. This model draws on ideas from Coburn (2003) on “rethinking scale” in the context of school reform, as well as ideas from Clark and Dede (2009) in respect of design for scalability. Coburn’s influential paper identifies four important dimensions requiring attention in scaling efforts: (1) depth, (2) sustainability, (3) spread, and (4) shift in reform ownership. “Depth” refers to reform that effects consequential change in classroom practice, entailing changes in teachers’ beliefs, norms of social interaction in the classroom, and pedagogical principles enacted in the curriculum. “Sustainability” refers to the requirement that changes need to be sustained over time. The notion of “spread” refers not only to more classrooms and schools taking up the reform; it also subsumes that of “spread within,” whereby reform becomes broadly embedded within and across classrooms, schools, and school districts. Finally, “shift in reform ownership” emphasizes the importance of the reform process no longer being controlled externally. Instead, the process becomes internally controlled, with teachers and other school agents taking personal ownership of the reform agenda.

Clarke and Dede (2009) propose the addition of a fifth dimension: evolution. They emphasize the importance of innovation adopters revising and adapting the innovation such that “tinkering” influences and reshapes the thinking of the innovation’s original designers. This notion of evolution is intertwined with that of ownership for the former cannot take place without the latter. However, Clarke and Dede alter the “tone” of the discourse. They speak of “educational innovation” rather than “school reform” due to their technology-centric interest in the River City curriculum that uses immersive virtual environments.

Our experience working on intervention research introducing game-based learning in the classroom instills strong empathy for the importance of building human capacity through teacher professional development as well as promoting teacher ownership of the innovation. We therefore proposed an appropriation model of innovation uptake (see Figure 1) as a way to conceptualize our “scaling” effort. The emphasis on appropriation (Rogoff, 1990, Vygotsky, 1987) places teachers at the center of achieving success in “scaling.” Hence, the model is *teacher-centric*. Through our own appropriation and reconstruction of key concepts drawn from the existing research literature, our model shifts attention away from a system perspective of “scaling up” to one where teachers play the central role. Via this repositioning, the model foregrounds the importance of “shift” as critical to what is required for teachers to sustain and spread the adoption of game-based learning.



**Figure 1:** Appropriation model of innovation uptake

The appropriation model positions depth and ownership as critical factors for achieving a stable shift in teaching practice. It also recognizes the importance of system support for accommodating and rewarding innovative teaching practice. “Depth” refers to how deeply teachers understand the pedagogical rationale of game-based learning, as explicated in the PPD model referred to earlier. Unlike Coburn (2003), where “shift in reform ownership” constitutes a *dimension*, we have separated out “ownership” from “shift.” “Ownership” is now a teacher-centric *factor* that refers to the extent to which teachers feel they own the innovation. “Shift” refers to the process of change that teachers work through to achieve outward-rippling change that impacts the classroom and school culture through reformed teaching practice. Stable and entrenched shift is the critical success factor for attaining sustainability and spread. Whereas Coburn proposed a collection of four independent dimensions, we have taken her seed ideas and translated them into a model: a more systematic framework for thinking about “scaling” through the lens of teacher appropriation. Accommodating Clarke and Dede’s (2009) proposed fifth dimension, evolution, we have translated this temporal aspect into “design re|construction.” It refers to teachers taking the original educational innovation, developing their personal construction of it, and iteratively reconstructing it to adapt the innovation to their own needs. This re|construction also allows teachers to adapt the innovation to fit with any specific local or cultural influences or constraints that apply in their individual contexts. The model is thus process centric (Chee, 2010, Rescher, 1996). It foregrounds the process of change and development inherent in teacher appropriation.

### 3. Reflective, reflexive guided appropriation

As we engaged in our classroom research with teachers over three curriculum implementations from January to February 2012, we became increasingly aware that our original appropriation model omitted a critical element: that of teacher identity. This awareness led to a revised appropriation model that emphasizes the importance of teachers reflecting on and being reflexive toward their teaching practice as they navigate the process of shift with the support of concurrent professional development. In what follows, we first describe how we supported teachers through reflective, reflexive guided appropriation. We then present the revised appropriation model: RRGGA.

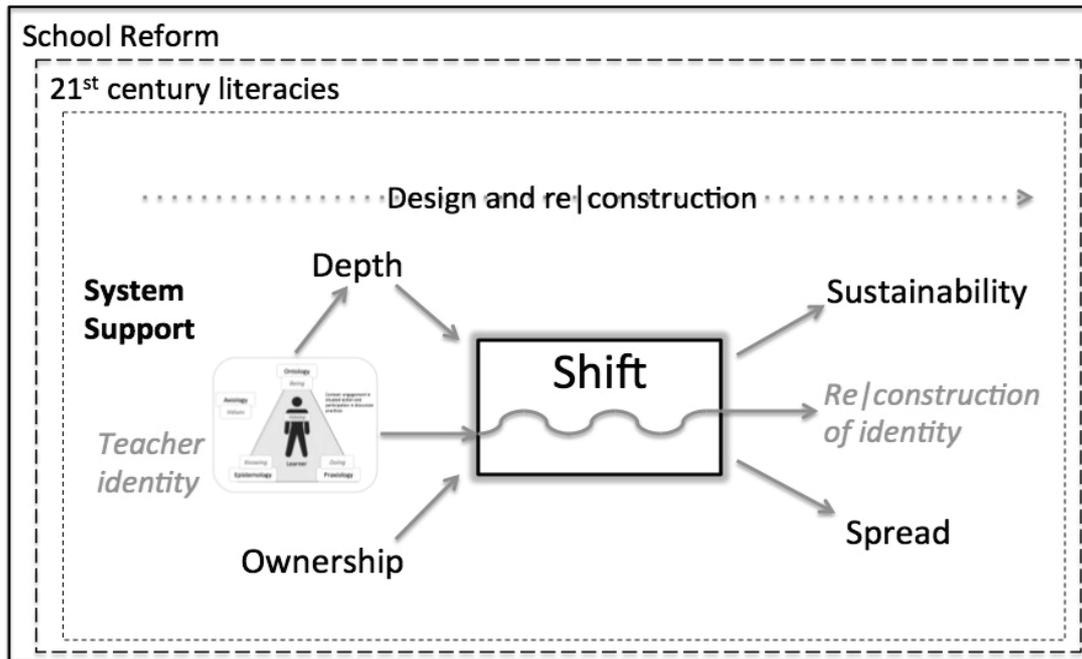
#### 3.1 Reflective, reflexive guided appropriation as process

A key goal of our research project is to unpack what the appropriation process is like for teachers in a personal, subjective, and visceral way. Methodologically, this translated into carrying out teacher case studies that focus on how they learn to enact the Statecraft X pedagogy in the classroom, with professional development support from the research team. Prior to the classroom work, we conducted a pre-intervention interview with each teacher. Operationally, we attended every classroom session and observed how teachers enacted their teaching. Of the six-session curriculum spread over three weeks, we led the first session. It focused on introducing the game’s backstory and user interface to students. Two teachers led each of the remaining five sessions. We interviewed teachers individually after sessions 2 through 6.

Our interviews were guided by a set of predetermined questions that sought to elicit the challenges teachers faced, their evolving understanding of game-based teaching practice, and teachers' narratives that illuminated their evolving identities. These interviews typically lasted between 40 to 60 minutes. Conceptually, our method is located in Dewey's metaphysics of ongoing reconstruction where "our actions, our behaviors, our social constructions, deconstructions, and reconstructions have ontological significance" (Garrison, 1994, p. 8). From this perspective, the interview instantiates a space of situated action and dialog, and teachers author themselves through their interaction with us as researchers. Consequently, the interview process is trans-actional in the sense articulated by Dewey (Garrison, 2001). In communication, "all events are subject to reconsideration and revision; they are re-adapted to meet the requirement of conversation, whether it be public discourse or that preliminary discourse termed thinking. Events turn into objects, things with a meaning" (Dewey, 1925/1988, p.132). The interviews not only aided the teachers in making meaning. They were also dialogical transactions. As Sullivan (2012) argues, not only are ideas exchanged, but "ideas are actually lived rather than abstract and are full of personal values and judgments" (p. 2). In this way, drawing upon Bakhtin's (1981) theoretical construction of dialog, a more visceral understanding of teachers' experiences was constructed: a sense of "truth as lived" (Russian: *pravda*) rather than "truth as abstract" (Russian: *istina*).

### 3.2 The revised model

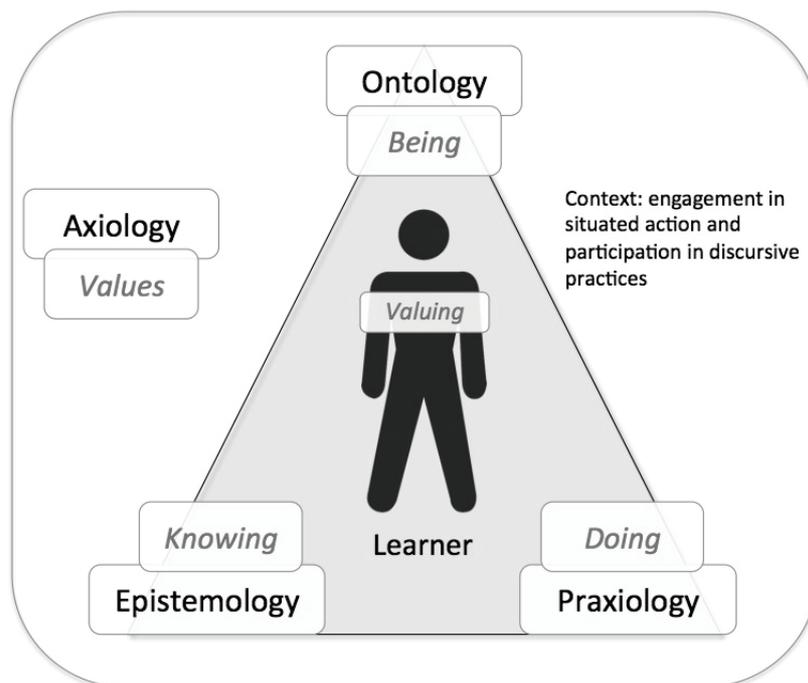
For Bakhtin, dialog is epistemological as well as ontological; that is, through dialog, we come to know as well as come to be (Holquist, 2002). Through recurrent dialogic interviews with teachers, we slowly realized that we were scaffolding teachers' development of practice through reflective, reflexive guided appropriation. We also realized that this process plays a critical role in the shift of practice that we were encouraging. Consequently, we revised our appropriation model. The RRG model (see Figure 2) reflects two changes. A minor change relates to the two enclosing boxes that signify the subsuming contexts within which the model is situated; namely, the development of students' 21st century literacies within the broader context of school reform.



**Figure 2:** The reflective, reflexive guided appropriation model

The key change to the model is the addition of "teacher identity" as vital to the shift process. Teacher identity instrumentally impacts depth, the extent to which teachers grasp the pedagogy. Shift itself is a deeply personal constructive process. Its path is non-linear, as signified by the wavy line, and potentially unpredictable. To the extent that shift succeeds, teacher identity is reconstructed. As Dewey argued, "we are participants in an unfinished universe rather than spectators of a finished universe" (Garrison, 1994, p. 8). Hence, the re|construction of self is an ongoing process. If shift does not succeed, reconstruction fails, and teacher identity manifests no significant change.

Figure 3 unpacks the component teacher identity. This framework for studying learners in situated context is appropriated from our earlier work that focused on student learning (Chee et al., 2011). It is predicated on the philosophical basis for studying human learners that comprises *ontos*, *logos*, and *praxis*, with all three intertwined and grounded in axiology, the study of human values. In the context of our research, teachers are as much learners as the students whom they teach. To understand human learning authentically, we deem it vital that learning be studied in the context of humans participating in situated actions, including the enaction of discursive practices that accompany everyday actions. Learners manifest values through the choices and decisions they make in everyday actions. These acts of valuation, namely “valuing” shown in Figure 3, are dialectically related to the sedimented values held by members of society at large. Knowing, doing, and being are inherently value-laden activities (Ferré, 1996). Humans make basic value distinctions related to all processes and outcomes of learning. These distinctions guide their learning actions toward outcomes that create positive value for themselves.



**Figure 3:** General framework for studying learners in situated contexts

#### 4. Tensions faced by teachers

In this section, we cite instances from interview transcripts that highlight tensions faced by teachers. They identify perturbations to teacher identities as well as constraints imposed by the school system.

##### 4.1 Sense of professional responsibility

A question that we posed to teachers during the pre-intervention interview was: “How do you see yourself as a teacher? What does it mean for you to be a teacher professionally?” Some responses we received were:

*Teacher D: Actually in terms of academics I am teacher who tries to bring out the best in the students. I try to especially, when it comes to paper success like I want them to get good grades. That is my main focus usually.*

*Teacher C: For me, I want to make students better in their studies because there are students who can do well but there are students who are struggling. It's not that they are not hard working, they are quite hardworking, but it's just that they cannot get it, so for these kind of students I want to ensure that they got the right steps to answer questions .*

..

*Teacher B: I believe that my role as a teacher is to help them – help my students to develop as a being, and um in all aspects that will make them survive in this constantly changing environment so that umm they will succeed in their lives.*

The excerpts illustrate how teachers view professionalism differently. Teachers D and C manifested a very restricted sense of what it means to be professional: helping students get the right steps to answer questions and thereby obtain good grades. In contrast, Teacher B saw her role in terms of developing students as human beings and preparing them for challenges that a world in constant flux will bring.

## **4.2 Entrenched teaching habits**

In adapting to the dialogic nature of student participation advanced by the Statecraft X pedagogy, teachers were forced to confront entrenched teaching habits.

*Teacher C: And one thing I noted was in dialogic right . . . because they are seated on the chair, they are not taking down much notes. Yeah, even though I tell them to, they do not write. So that is one thing that I find that because they tend to forget what we mentioned or even if it's about different perspective, they do not take down important points.*

*Teacher A: I think as a teacher, we want a certain amount of control in our classroom. We don't want to know . . . you know, we don't know what's going to happen or we don't know what the kids are going to say.*

Dialogic learning requires collaborative sense making as part of a conversational process. Teacher C, however, lamented that students were not taking notes because, being seated in a U-shape, they had no desk to write on. In so doing, she demonstrated a fixation on students recording notes and her valuation of learning product over learning process. Teacher A expressed unease over not having control in the classroom due to a loss of certainty over what would take place during lessons. This difficulty arose from habitually having prepared lesson plans prior to stepping into the classroom. Fortunately, by the end of the second enactment of the curriculum, Teacher A had overcome this concern. She learned to go with the flow of student triggered dialogic conversation.

## **4.3 Questioning of deeply seated epistemological beliefs and values**

Some teachers showed a strong tendency to objectify knowledge and treat it as a “thing.” They also attached high value to students knowing facts.

*Teacher D: I think it was enjoyable, I mean for once it's like a game of catch catch catch. Yeah so it's like just keep catching their ideas.*

*Teacher D: I mean all I had to do was listen and give out the correct question and listen for the key points that actually contribute to the whole discussion, yeah to sieve out the important things to . . . and repeat them again – to repeat the important points again.*

*Teacher D: As you can see you when I asked “what is the name of the president, what is the name of the . . .” You can see the difference in level—that's why we cannot pursue that into that depth. . . . So . . . basically what they are in the know is quite limited actually in terms of what they read, because they don't . . . our students did not read widely enough. (italics indicates speech emphasis)*

Teacher D spoke of knowledge in terms of important points and ideas. He likened his role in the classroom to playing a ball game where he had to “catch” students' ideas. He was also primarily concerned about students having the “key points” and the “important points.” He lamented that his students were of lower ability, and hence of a different level, compared with students in other schools. Because the students were also not widely read, the teacher felt that they lacked “content knowledge,” such as knowing the president's name. Consequently, he had to trade off depth of dialogic conversations that we encouraged in favor of students learning facts.

## **4.4 Misalignments with conventional modes of assessing student learning**

In the Statecraft X curriculum, student learning outcomes were determined by means of a written essay that appraised students' understanding of and disposition toward active citizenship and governance. It was evaluated by means of a rubric on four criteria: (1) multiple viewpoints, (2) solutions supported by evidence and argumentation, (3) disposition of active citizen, and (4) persuasiveness.

*Teacher A: We touched on diplomacy, we touched on good governance, we touched on, you know everything, we talked about conflict and then um, but then if I were*

*to let the kids write an essay now, that is . . . you know on a question that is based on the SEQ kind of format, then I think they will do very well in explaining. . . . But they cannot get the highest level unless they tell me specifically the 'what'. So if I'm going to ask them "do you know anything about healthcare in Britain?" They probably can't tell me the details. Which is necessary in the answer in the exam.*

*Teacher E: I don't worry about the experimental group – the 3A, they are fine. Because everything has been aligned. I can see that from the beginning, you know, the pedagogy, the resources, the assessment, everything has been aligned. So I have no issues with that, I am very comfortable. . . . My perceived disadvantage is that the 3B have not had that advantage. You see so while the pedagogy remains very much content-based which is what normally we do, the assessment is value-based.*

The acronym SEQ used by Teacher A refers to “structured essay question.” The formal curriculum requires students to “know content” in order to score well in SEQ. Although Teacher A was confident that her students would do well in explaining their answers, she was concerned that they would not score top marks because the Statecraft X curriculum did not provide them with adequate “content knowledge.” Teacher E, the head of department for humanities in one of the schools, did not teach the curriculum but participated by observing her teachers in the classroom. She expressed satisfaction with the Statecraft X curriculum’s coherence. However, the tension it created for her was that the assessment was, to a large extent values based, when the standard curriculum substantially demands facts. Consequently, she worried that the assessment was not fair to students of 3B, the control class. In general, teachers felt they had no power to change the school system’s requirements. Those who understand education more deeply learn to work around constraints and provide students with learning experiences that go beyond that mandated by official curricular requirements.

## **5. Summary findings and discussion**

The excerpts from Section 4 show that (1) teachers’ self-understanding of their professional roles and responsibilities, (2) their entrenched teaching practices based on prior learning and accumulated teaching experience in the classroom, as well as (3) their epistemological beliefs about knowledge and thus how they value content more than fostering dialog and sense making in the classroom, all played critical roles in their enactment of the Statecraft X curriculum. These factors are central to teacher identity as understood from a performance perspective grounded in knowing–doing–being and values. The fourth factor, misalignment of assessment modes, concerns the contextual factor, system support, in the RRG model. In general, the tension between the system’s traditional emphasis on content and the Statecraft X curriculum’s orientation toward performance, incorporating the development of active citizenship through knowing, doing, being, and valuing, persists and remains unresolved. While the Ministry of Education has set forth a blueprint for the development of 21st century competencies (Ministry of Education, 2010), much work remains to be done for it to be realized.

Based on our research experience, teacher identity impacted the extent to which teachers were receptive to the ideas advanced by the performance oriented pedagogy of the Statecraft X curriculum, and receptivity affected how well teachers understood and attempted to enact the pedagogy: a reflection of depth in the model. Interestingly, we did not find ownership to be an issue with teachers. This outcome may be due to the design of the curriculum providing teachers with ample room to imprint their personal teaching style on its execution either because of its inherently open and dialogic design or due to deep understanding dissipating concerns with personal ownership because of being persuaded about the soundness of the curriculum’s design.

It should be noted that in reality teacher shift is one of degree. We see stronger shift in some teachers than in others. Notwithstanding, it is quite easy to judge whether any particular teacher crossed the shift threshold. From the perspective of performance theory (Carlson, 2004), successful learning is liminal. It marks the passage to an enhanced state of living that is the outcome of a transformational experience. Teachers who experienced shift as seriously dislocating and for whom it triggered a process of introspective reflection went through deep transformation. Teacher B, for instance, likened her learning journey to the process of transformation from an ugly caterpillar to a beautiful butterfly. Such teachers reported that they appropriated dialogism in their teaching of other subjects and with other classes even before our intervention work with them concluded. Such appropriation is performative in nature, and it is a significant success indicator. Teachers who did not experience

perturbation to their understanding and a deep sense of disequilibrium showed the least growth in terms of professional development.

We emphasize that our efforts must be seen in the context of school reform needed to genuinely develop 21st century literacies. We do not participate in the discourse of ICT integration in teaching and learning. Neither are we enthused by the discourse of using games to achieve student engagement in the classroom. From our perspective, student disengagement is the natural outcome of poor learning design. Through game-based learning, we hope to provide students with an education experience that allows them to be participants in life rather than be mere spectators, as Dewey argued.

## **6. Conclusion**

In this paper, we highlighted the importance of teacher preparation for game-based learning to become more widespread in classroom teaching and learning. We shared our work on teacher professional development in pursuit of equipping teachers to succeed with game-based learning. Beginning with a first appropriation model, we described how we felt the need for an enhanced model rooted in reflective, reflexive guided appropriation. The instances of tensions that teachers faced when enacting game-based learning in the classroom illuminate the challenges of preparing 21st century teachers. It also highlights the centrality of teacher identity to the process of shift and transformational growth. Our findings indicate that teachers have to deal with complex personal issues, in addition to managing social and institutional factors, as they navigate the process of leveling up their teaching practice.

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